VIVISECTION.

A

Prize Essay,

BY

G. FLEMING, ESQ. F.R.G.S., F.A.S.L.

Veterinary Surgeon, 3d King's Own Huzzars:

Author of "Travels on Horseback in Manchu Tartary," etc.

"Sævitia in Bruta est Tirocinium,
Crudelitatis in Homines."
Le Clerc, in Proverbs.

PUBLISHED ORIGINALLY BY

THE ROYAL SOCIETY FOR THE PREVENTION OF CRUELTY TO ANIMALS.

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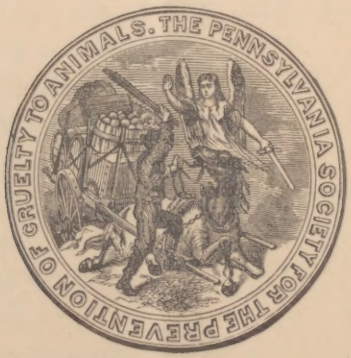

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PREFACE.

The Royal Society (of England) for the Prevention of Cruelty to Animals offered prizes, in the year 1866, for the best Essays on the two following propositions:

I. Is Vivisection necessary or justifiable (when performed, as at certain Veterinary Schools) for the purpose of giving dexterity to the operator?

II. Is it necessary or justifiable for the general purposes of science, and if so under what limitations?

Thirty-two Essays were received, a majority of the following judges decided in favor of that by G Fleming, Esq. and the first prize, (fifty Pounds,) was awarded to him.

THE NOBLE EARL, President of the Society,

HIS IMPERIAL HIGHNESS PRINCE LOUIS LUCIEN BONAPARTE.

RIGHT HON. AND RIGHT REV. LORD AUCKLAND, Bishop of Bath and Wells.

COL. F. H. BUCKERIDGE,

FRANK BUCKLAND, Esq., M. A.

DR. CARPENTER,

J F. CLARKE, Esq., (of the Lancet,)

DR. FRASER,

PROFFSSOR OWEN,

DR. QUAIN,

PROFESSOR SPOONER,

PROFESSOR VARNELL.

The Essay on the Second Proposition is the one here reprinted(almost entire) by the Women's Branch of Penna. Society for the Prevention of Cruelty to Animals.

VIVISECTION.

Is it necessary or justifiable for the general purposes of science; and, if so, under what limitations?

Besides those learned men who council the practice of Vivisection as a means of acquiring manual dexterity in veterinary surgery, there is a far more numerous body, who, while ready to discountenance and suppress such cruelties as we have enumerated, yet contend that for the general purposes of science, and especially for the welfare of mankind, the dissection of living animals is necessary, and to be justified on many pretences; and they appeal to what they consider valuable results, which certainly are far more plausible at first sight than those advanced in extenuation of the horrible acts considered under the previous proposition.

The avowed object of vivisection when pursued in the general interest of science, is to examine more particularly into those functions of animal life which are not directly accessible to observation; or to facilitate the study of those phenomena, which, by artificial means, are disengaged, wholly or in part from other collateral phenomena which render their appreciation difficult. Its ultimate aim is so to improve science, that the amelioration of human suffering may be more rapidly and surely attained.

That this may be the sincere desire of those who, by live dissections attempt to solve some of the problems of vitality, we take for granted, because we cannot believe that men brought up to the high calling of medicine would identify themselves with the repulsive practices included in the term "experimental physiology," unless they had some higher aspirations than to be patrons of cruelty. The results achieved however, looking at them from the most favorable point of view, be they valuable or otherwise, have cost an amount of suffering to sentient beings far beyond considerations of value or necessity, and which, when compared one with the other, fixes a perfectly just verdict of "needless and cruel" against nine-tenths of the almost endless number of experiments performed by physiologists* Where the lives of animals are

* See (a) Appendix.—Second Proposition.

sacrificed by tens of thousands; where the greater portion of these lives are yielded only after almost incredible pain and torture; and where every one who imagines he knows something of science, or is in any way interested in its progress, can slaughter as much as he chooses, and in any fashion he fancies, it is surely the interest of all men who are impressed with the nature of the sacred charge confided to them in the lives and welfare of highly organized creatures, to inquire whether the exquisite torture by which these investigations are accompanied, is really compensated for by corresponding benefits; and whether every one who imagines he is so privileged by his vocation as to trifle with pain and existence without being called to account, is competent to be a judge.

At first the physiologist or experimentalist may not be very cruel, his experiments may be few, conducted with as great a regard as possible to the avoiding of pain, and having the elucidation of the most profitable researches in view; but to him, as to other men, habit may render that which was at first, perhaps, most sickening and repulsive, an affair of but little moment; and the ready infliction of pain to any degree, and in any amount, will not, in all probability, appear in the same disgusting light, that it will do to the uninitiated, and less hardened individual. There are but few men who are capable of performing the parts of executioners, even when stern justice demands the taking away of life, or those of butchers, when animals must be sacrificed as food for man; and the dissector of live animals who has imbibed a taste, or fancies he sees some necessity for the practice, does not often exalt his labor to a more enviable degree in the estimation of the feeling and thinking world. Certainly in nearly every instance vivisections are less necessary, and are but too often accompanied by a larger share of torture, than the acts of either of these functionaries. The vivisectionist may be aptly compared to a remorseless inquisitor, who attempts to wring the secrets of nature from his victims by the most harrowing and protracted tortures; whereas the hangman, the headsman, and the butcher, are mercifully prompted to obviate suffering by instantaneous death. It is a thousand pities that of all the sciences, the most interesting, and, perhaps, important—that of physiology—is almost the only one sought to be identified with the apparently needless infliction of punishment, and the death of inoffensive animals by varied—sometimes ingenious, but distressingly slow means.

The barbarous character of vivisection cannot be defended, even by those who plead for it, and has ever been an unmitigated reproach to those who would thus interrogate nature by

the dolorific devices of art. From the time when Celsus, the Hippocrates of the Romans, blamed Herophilus of Chalcedon for having dissected the bodies of living criminals which had been given over to him by the kings of Egypt, up to the present day, when the voice of humanity is making itself more loudly and forcibly felt on behalf of the lower animals, many and just good men have given their opinion as to its barbarity.

Nothing but express considerations of great utility to suffering mankind, and something like certainty as to the measures employed to attain that high end, would allow of such a repugnant method of investigation being carried on; and it is only these considerations which are offered to counteract the legal and moral restraints which would otherwise be applied to suppress so abhorred a course.

But if instead of accepting this apology, and without inquiring more concerning vivisection, we ask for these great results purchased by the pangs of myriads of creatures and spread over some hundreds of years, what do we get? Scarcely anything but examples of profound error, and philosophers wading through agony and slaughter to doubt, confusion and contradiction. What better proof have we of this than in the writings and in the opinions of physiologists themselves.

Pick up any ordinary work in physiology, and you will find, when treating of the nervous system, that in it contradictions, fresh experiments, confessions of doubt, and appeals to many different results, are made in the endeavor to throw some light on this most prolific source of experimentation and confusion. The very highest authorities on physiology have given it as their opinion, that vivisection is not a trustworthy mode of ascertaining the mysteries attending the vital functions of animated beings, and while counselling other means of research, almost forbid adopting that of experimentation. And why? because its fallacies have proved a constant stumbling-block to investigators, and its deductions being nearly always at variance with those obtained from other sources, have often retarded the more successful, because more reasonable modes.*

Let me quote from the work of a French physiologist, who is a great advocate for vivisection, a staunch admirer of those men who have been notorious for their practice in that particular branch of science, and who is himself a most enthusiastic experimenter. M. Colin says,† "Of all the arts, that of experimentation is, perhaps, that which offers the most difficulty, because it is applied to the study of phenomena the

* See (*b*) Appendix.—Second Proposition.

† *Traite de Physiologie Comparee des Aaimaux Domestiques*, par G. Colin, Paris, 1854. pp. 31, *et seq.*

most complex in nature. It is a difficult art in conception, in the institution of experiments, and in their execution; this last demands the most exact anatomical knowledge, and the habit of manipulation. It is a delicate art; to perform an experiment well, it is necessary that those means be employed which will the best put in evidence, and permit to be analysed with the greatest exactitude, the functions that we study, without removing the animals but as little as possible from their normal condition. And, lastly, to appreciate these functions at their just value, it is most essential that we separate those results which belong to the very essence of the phenomena we seek to know about, from those which arise in the perturbations provoked by the vivisection. This separation, this distinction, demands more tact than we think, and more attention than is usually given to simple observations.

"In studying a phenomenon, we cannot completely isolate it from those with which it is intimately connected, and they are all so closely allied to one another, that none of them can be modified without implicating the rest. From the moment that a function is disturbed or removed from its normal conditions it changes its character, and all the others (if it is a function of some importance) experience a commotion more or less profound, and soon become suspended. The possibility of isolating physical or chemical phenomena, and the impossibility of isolating those which belong to the order of physiology, establishes a capital difference between the modes of experimentation, as applied to the first, and those which belong to the second. The difference is so great that it is impossible to see what there can be in common between the two modes.

"It is then superfluous for us to seek to apply a means of procedure which is inapplicable to physiological researches. . . . . The code of experimentation has need to be revised. . . . . Certain experiments are complex in their nature, when they are applied to important functions, the perturbations of which react on nearly the whole economy. Apply your instrument to the brain, or to the heart, and quickly you will have general and serious troubles which it is necessary to disengage from those which belong to the direct and immediate result of the experiment. There are organs so delicate that the slightest operation perverts their action and alters their character. Make the smallest wound in the stomach or intestine, and soon digestion is suspended, and the secretions of these viscera are diminished or suppressed." Speaking of the selection of animals for different experiments, he exclaims, "I cannot comprehend the routine of certain experimenters, some of whom have but the dog as

their victim, while others seek only for their information from the rabbit or the guinea-pig. It is because we overlook the necessity of experimenting on different types of animals, that are raised those eternal disputes, those contestations without end, between physiologists on the majority of questions. It will never be otherwise so long as we persevere in a way so vicious. . . . Often the same experiment repeated twenty times, gives twenty different results, even when the animals are placed apparently in the same condition.

. . . "It may even happen that the same experiment gives contradictory results. In neglecting to repeat experiments many times, we are exposed to take the exception for the rule, the accident for the constant fact, the accessory for the principal fact. Unfortunately this happens too often. This is why, on nearly every occasion, we oppose a result to another of a contradictory nature. Which of the two is the true one? It is necessary to recommence in order to learn, and when we have done so, the other yet remains to be accounted for."

We have here a tolerably fair opinion of the merits and benefits supposed to be derived from mutilating animals; and with all the sagacity of this author, and the care with which he performed his own experiments, very many of the results he arrived at would be disputed by as many physiologists. Indeed, that portion of his book devoted more particularly to a study of the nervous system, is so rife with conflicting statements derived from vivisection, that one wonders why a mode of research, which is so obviously fallacious, should be so extensively pursued by men who ought to know the proper and primary principles of inductive philosophy before they presume to tamper with sensibility. From the time of Galen there has been a misappreciation of facts, when researches on the living body were pursued with chisels, knives and needles. The methods of induction applied to this branch of science have been far from happy; error has propagated error, and those beautiful, but mysterious operations of nature, when sought to be rudely exposed, so that their harmonious action might be disclosed to inquisitive man, have only been seen or manifested in an abnormal or disordered condition from whence proceeds false reasoning and conflicting conclusions. And can it be wondered at, that the martyr when delirious from the tortures of the wheel or rack, should give a faltering incoherent answer, liable to any sort of interpretation, to the queries of the inquisitor?

If, as Sir Charles Bell asserts, "confusion is a monster of Science," perhaps I am justified in contending that this monster is the most marked result vivisection has endowed the science of vitality with.

Take the brain which has been of all organs the most enticing to the physiologist, and the knife, forceps, and chisel of the vivisector. After an amount of torture which the mind shrinks from contemplating, what do we obtain? Speculation! Gratiolet, one of the most learned men on this and kindred subjects, says, "Let us confess that in our ignorance of the true construction of the medulla, the peduncles, and the optic thalami, the question is abandoned to the *speculations* of physiologists.*

Dr. Kellie first started the notion that the quantity of blood within the cranium was constantly the same. Without fully informing himself as to the anatomical peculiarities which have since been pointed out, he hastened at once to the favourite method of seeking to verify conjecture; he bled sheep, cats, and dogs to death, and hung others with the head downwards. He imagined he was justified in these experiments by having discovered a new feature in the circulation of the brain; but Dr. Burrows, Breschett, and others, have shown that he was entirely wrong, and that a sufficient knowledge of anatomy would have prevented this torture.

Ignoring altogether the teachings of pathology or observation, the sensitiveness of the brain has been a moot point with experimenters. Aristotle and Galen believed the cerebrum insensible, and numerous vivisectors have shared this opinion. But Haller, Zinn, and Serres, after the usual amount of cruelty, came to a different conclusion; the animals they experimented upon became convulsed, screamed, and uttered painful cries when this part was punctured or sliced away. MM. Flourens, Longet and Colin, thereupon set themselves to work upon all kinds of animals, from horses and dogs downwards, and the conclusion they came to was, that sensibilty was doubtful; but there was no excitability. Magendie, that prince of vivisectors, who never lacked an excuse for the indulgence of his savage predilections, withdrew the fluid which surrounds the brain and spinal cord by puncturing the membranes, and found that some animals were affected by dullness and stupor, but in two cases they were in a continual state of agitation and fury. Ecker removed this fluid by an aperture between the scull and the atlas; and the animals lost their equilibrium, while spasms and tremors occurred in the extremities. But Magendie went farther, and chiseling and sawing off the upper parts of the cranium of living animals, began to remove by successive slices the substance of the brain, leaving the medulla oblongata intact. Although rendered blind the poor brutes continued to be affect-

* *Gratiolet Memoire sur les Plis Cerebraux de l'Homme et des Primates.* Paris, 1855.

ed in as lively a manner by pungent odors or tastes, or by irritation of the skin, as if no further injury had been sustained than the loss of blood occasioned by the experiment. A full-grown hedgehog cried if a hair of its whiskers was plucked, or vinegar held to its nose, and strove with its fore feet to rid itself of the annoyance. These phenomena lasted for more than two hours. Flourens repeated this, and found that life continued a certain time; the creatures moved about, retaining their equilibrium and locomotory functions, but were drowsy, and as if they had lost their senses. They neither saw nor heard; had lost memory, instinct, intelligence, volition. They did not move spontaneously: if they were pushed they went along, but ran against surrounding objects without trying to evade them; if thrown on their backs they recovered their feet again; if struck they did not attempt to run away. When hungry they had no idea of eating, but if food or fluid was placed in their mouths they swallowed readily. In this miserable state some of them lived for entire months—a fowl deprived of its brain survived its loss for nearly a year, and pigeons from twelve to eighteen days. The horse seldom lives beyond twelve hours. Now, long before these wicked mutilations were practised, the fact was well known by the experience of the hospital or battle field, that the brain has no common sensibility, and that life may be prolonged for many days, or recovery may even take place, after the loss of a large quantity of brain.

A host of vivisectors disagree as to the functions of the brain, each disagreement calling forth a fresh series of tortures still more contradictory in their results—because depending upon so many different influences; but all partaking of the horrible. Here is a sample of what is supposed to be the pursuit of science —"When, after a series of transversal sections of the encephalon, we have reached the medulla oblongata, just above the upper roots of the par vagum we find that respiration continues almost normal. If we now cut away the part of the medulla giving origin to this pair of nerves, we find in most cases that respiration is suddenly stopped. . . . . The stronger an animal is, the more parts of its encephalon can be taken away before we destroy respiration. . . . . It seems indeed, wonderful to see animals, after the puncture in some part of the encephalon with the point of a needle, turn round, just like a horse in a circus, or roll over and over for hours. . . . The trunk and neck of the animal are bent by a spasmodic action on the side of turning, if it has a circus movement; and it is bent like a corkscrew, as much as the bones will allow, in cases of rolling . . . . To add to the strangeness of the

fact, in the last case the muscles remain contracted, sometimes for hours, sometimes for days and weeks. . . . . As long as it lives (many days, or even many months) these phenomena may be observed. . . . . In mammals, the least puncture of the auditory nerve causes rolling; violent convulsions then occur in the eyes, the face, and many muscles of the neck and chest."*

Professor Hughes Bennett tells us that the results of experiments by Flourens, Rolando, Hertwig, and others, have shown that on slicing away the brain, the animal becomes more dull and stupid in proportion to the quantity of cortical substance removed. But he also mentions that clinical observation points out the fact, that in those cases in which disease has been afterwards found to commence at the circumference of the brain, and proceed towards the centre, the mental faculties are affected first; whereas in those diseases which commence at the central parts of the organ, and extend outwards, they are affected last. How impotent then has been experiment, and how much more valuable the observations of pathologists. This learned writer also states that, "in making experiments on animals, it is often impossible to ascertain how far the shock of the operation, the flow of blood, or the destruction of other parts may vitiate the results." Again, in speaking of the nervous system, he says "anatomy, human and comparative, has furnished us with many valuable facts; but it is not easy to determine what are the nervous ganglia or other parts in the lower animals which correspond with what exists in man; whilst erroneous interpretations as to the habits and motions of these creatures are too readily formed . . . . This last"—the effects of the disease—"is by far the most important means of research open to us."†

If the Cerebrum or larger brain has rendered such unsatisfactory evidence under the heart-sickening cross questionings of the mutilator's knife, the Cerebellum, or little brain, has afforded them even less. By chiselling off the top of the skull of many descriptions of living animals, MM. Flourens, Magendie, Bouilland, Hertwig Longet, and others, imagined that it was insensible, because by pricking it, slicing it away, and other means, neither pain nor convulsions was induced. M. Colin made a number of experiments on the horse, and obtained a different result. The functions of this part have given rise to conflicting theories and speculations. M. Flourens says,‡ "I have removed by successive layers, the cerebellum

* *The Lancet*, December 11th, 1858, pp. 600, 601, 625.
† *Outlines of Physiology*, by J. H. Bennett, Edinburgh, 1858.
‡ *Recherches Experimentales sur les Functions du Systeme Nerveux*, p 37.

of a pigeon. During the ablation of the first layers there only appeared a little feebleness and want of harmony in its movements. When I cut to the middle layers, it manifested a universal agitation, but without convulsions. Its movements were fierce and disorderly; it was able to see and hear. When the last layers were cut, the bird, whose jumping, flying, walking, and turning faculties had been more and more altered by the preceding mutilations, completely lost them. Placed on its back it knew not how to recover itself. Far from resting quietly on its legs, as with the pigeons whose Cerebellum had been destroyed, it seemed continually and madly agitated, but it never moved in a firm and determined manner. For example, it saw a threatened blow, wished to fly, and made a thousand contortions to evade the seeming danger, which it was unable to do. Laid on its back, it could not rest until after being spent in vain endeavors to regain its feet, it was obliged to lie. Finally, the volition, the sensations, the perceptions persisted; the possibility of executing movements also remained, but the co-ordination of these movements into regulated and determined movements was lost." The same results were obtained on larger animals. M. Colin says, "By all these results which I had the pleasure of seeing re-produced in the lectures of M. Flourens . . . I have tried to repeat on solipedes these experiments. . . . Having laid bare this organ in a draught horse, by raising the superior part of the occiput, I have thrust a scapel into its middle lobe, but not deep enough to touch the spinal cord; then the horse shook its head, but did not experience any convulsions. After a second and a third stab its walk became tottering, its legs were wide apart, and threw its first weight on the fore extremities, and then on the hind one, the better to preserve its equilibrium. When it went along we saw its body swaying alternately from right to left, and as if it would fall. It soon manifested a marked tendency to bear in front, and took the attitude of a horse about to throw all its weight into its collar. At this time seven or eight students were under the necessity of pulling him back by the tail to prevent his advancing. Another stab caused the limbs to be flexed, and determined the fall of the solipede Another horse had the cerebellum punctured through an opening in the skull which had been made with some care by the trephine. He presented the same phenomena as the last, but without the tendency to advance; he saw, heard very well, advanced, backed, turned to the right or left when required to do so, and did not execute any convulsive movement. Magendie cut one of the peduncles of this organ, and says, "One of them being cut, all at once the ani-

mal began to roll laterally on itself, as if it had been pushed with a great force. The rotation was made from the side where the cut was made, and sometimes with such rapidity that the animal made more than sixty revolutions in a minute. This singular and painful movement has lasted, nearly without interruption, four entire days; it was only stopped by mechanical obstructions, often then the animals held their feet in the air and ate in this attitude."* Thousands of like experiments have been made on this part of the brain, and what have they yielded? Duges thought it an organ of hearing and the perception of taste. Rolando thought it the central source of all voluntary motion; Magendie imagined that it impelled the animal forward; Flourens, Hertwig, and other vivisectors supposed it to be the regulator of voluntary movements; and others again quite dissent from all these conjectures; Brown Sequard declares that the guiding power has not its seat here, and that pricking several parts of the encephalon with a needle produced the same disordered movements. Schroeder van der Kolk announces that "the cause of the coordination of the muscular movements is situated in the spinal cord, and it has always been incomprehensible to me how any one could ever have referred it to the cerebellum. In ulceration of that organ, I have never seen irregular movements." After the thousands of experiments made by these gentlemen, by which they are enabled to contradict each other, and after all this fiendish massacre, the latest writer on the nervous system, Moritz Schiff, a man who has gained some notoriety as a Vivisector, concludes, from numberless other experiments he has made, that the functions of the cerebellum are altogether unknown!

The nature of the functions of the medulla oblongata has been almost as prolific of experiment and pain to animals—disordered movements, convulsions, and agony accompany each step of the enquiry. Magendie wounded a certain portion, and the eye of that side was fixed downwards and forwards, while the opposite eye was drawn upwards and inwards. M. Colin reproduced these amusing phenomena, but, of course, with slightly different results, in a ram After puncture, the eyes began to *pirouette* in their orbits. The right eye was drawn upwards, and exposed a large portion of the white, the left looked downwards, showing the whole of the cornea. They preserved this position with some convulsive movements, for more than two hours, after which the animal was sacrificed.

It is needless to detail more of the sections and punctures so

* *Precis Elementaire de Physiologie.* 4th ed. Vol. I, p. 410.

cruel and so fruitless, gone through year after year, in this particular region, save to give the last investigator's opinion I can find. Schroeder van der Kolk asserts, "That the medulla oblongata" (not the brain) "is the seat of perception, can scarcely any longer be a subject of doubt. Not only is it known that the brain itself is insensible, but while the nerves of sensation in the spinal cord pass upwards, the trigeminus descend to the medulla oblongata, that is to the seat of perception."* But like all vivisectionists, he is either at disaccord with himself or others. In the remarks on "Shrieking," he says, "There are, in fact, many involuntary actions, which we ordinarily regard as voluntary; for example—shrieking with pain. This shrieking appears to be merely the effect of a reflex action on the upper part of the spinal cord, or medulla oblongata. . . . Hence it follows, that in vivisections so many incorrect inferences are drawn as to feeling or perception in animals If the brain is cut off above the pons varolii, and the fifth pair of nerves be strongly stimulated, the animal will cry out, although without consciousness, without perception, and without feeling of pain." Was ever anything more unreasonable, more contradictory, or more characteristic of this harsh system, of trying to wring out the truth by violent and audacious means! If the medulla is the seat of perception and sensation, how is it that cutting away the brain destroys sensation, when what is left, the medulla oblongata, is entire, and the sentient centre?

The spinal cord, in its entire length, has been exposed and divided by tranverse and longitudinal sections, while the animals were alive and conscious, but the results of multitudinous mutilation only go to show that they were unnecessary and unjustifiable when other modes of discovery were more serviceable and far less brutal.† In the beginning of this century, when anatomy had suggested the functions of the roots of the nerves at their origin in the spine, vivisectionists began to experiment upon the discovery, and it afterwards became a favorite mode of teaching to have a number of living animals mutilated and tortured without mercy, for the purpose of exhibiting these functions. It is most extraordinary, that even if humanity did not forbid this custom, common sense at least should not have interfered so far as to suggest, that, when the vertebræ have been hacked and the spinal canal laid open by saws and chisels; when pain and loss of blood have disordered all the functions of nature; and when—happily for the suffering creatures—death is imminent—no rational conclusion can be

* *On the Minute Structure and Functions of the Spinal Cord and Medulla Oblongata;* translated by W. D. Moore. London, 1859.

† See (*c.*) Appendix.—Second Proposition.

which motion it would be difficult to distinguish from that proformed as to the normal functions of these parts. As usual, whenever experimentation began, then began the squabbles of the numberless torturers, and countless dogs and other animals were condemned to suffer the most awful agony possible in these disputes, which subsequent and more reasonable investigation has shown to be to a great extent ill-founded and of the nature of faction-fights. The common sense view has been gradually gaining ground with all, save those who delight in living dissections; and it is acknowledged by the best physiologists, that a careful register of the phenomena of disease, followed by *post-mortem* examinations, is generally more to be depended upon than those experiments, so revolting to humanity, which have disfigured the emblem of science; but from which, nevertheless, different investigators drew different theories to suit his own special view of the case. One of the greatest of English physiologists, Sir Charles Bell, was compelled by the incredulous and prejudiced to resort to direct experimentation on this subject, in which he was a great discoverer, in order to prove to others what anatomy had already taught him. But the suffering which this barbarous mode of proving a discovery caused was ever present to him, and though his whole heart was devoted to science, yet it was never moved to prolong or repeat these experiments. "It is a duty to avoid the unnecessary repetition of experiments" he says. He saw the great cruelty and the uselessness of them, and throughout his writings there is a constant allusion to them in this humane light. "The dura mater (the membrane covering the brain) is insensible, as we can prove by the operation of trepan: it has, in the way of experiment, been pricked and injured by every possible contrivance, by mechanical and by chemical stimulant; yet the animals, the subjects of such cruel experiments, have given no signs of pain." With regard to his discovery then, he tells us—"It was necessary to know, in the first place, whether the phenomena exhibited on injuring the separate roots of the spinal nerves corresponded with what was suggested by their anatomy. After delaying long, on account of the unpleasant nature of the operation, I opened the spinal canal of a rabbit, and cut the posterior roots of the nerves of the lower extremity; the creature crawled, but I was deterred from repeating the experiment, by the protracted cruelty of the dissection. I reflected, that an experiment would be satisfactory, if done on an animal recently knocked down and insensible; that while I experimented on a living animal, there might be a trembling or convulsive action exerted in the muscles by touching a sensitive nerve,

duced more immediately through the influence of the motor nerves. I therefore struck an animal behind the ear, so as to deprive it of sensibility by the concussion, and then exposed the spinal marrow. On irritating the posterior roots of the nerve, I could perceive no motion consequent in any part of the muscular frame, but on irritating the anterior roots of the nerve, at each touch of the forceps there was a corresponding motion of the muscles to which the nerve was distributed. These experiments satisfied me that the different roots and the different columns from whence these roots arose, were devoted to distinct offices, and that the notions drawn from their anatomy were correct."

The dissectors of live animals, ever glad to get a distinguished name or a great discovery to countenance their repulsive occupation, have cited Sir Charles Bell as an authority for vivisection, and no one can deny the right he has to be heard on such a matter. "In a foreign review of my former papers, the results have been considered in favor of experiments on living animals. They are, on the contrary, deductions from anatomy, and I have had recourse to experiments, not to form my opinions, but to impress them on others. It must be my apology that my utmost powers of persuasion were lost while I urged my statements on the ground of observation alone." Again he says, "Anatomy is already looked on with prejudice: let not its professors unnecessarily incur the censures of the humane. Experiments have never been the means of discovery, and the survey of what has been attempted of late years will prove that the opening of living animals has done more to perpetuate error than to enforce the just views taken from anatomy and the natural sciences."

In an early experiment, he acknowledges his want of success —"But here there was confusion, because of sensation, therefore the animal was instantly destroyed by a blow on the head, because sensation obscured the reasoning of the experiment."* Years have gone by since these words were written, and yet we find by the statements of vivisectors themselves, that the spinal cord and nerves have been, and are now exposed, cut, pinched, punctured, galvanized, burnt with hot irons, and destroyed by chemicals, while the animals yet live and feel, but with what object it is difficult to guess, if not for the sake of merely making experiments, or contradicting some other experimenter's conclusions.

Two celebrated English physiologists, who deserve to be listened to, give it as their opinion that "Direct experiments

* *Anatomy and Physiology.* by J. and C. Bell. London, 1829.

on the anterior and posterior columns of the cord are surrounded with difficulties which embarrass the experimenter and weaken the force of his inferences. The depth at which the cord is situate in most vertebrate animals, its extreme excitability, the intimate connection of its various columns with each other, so that one can scarcely be irritated without participation of the others, the proximity of the roots of the nerves to each other . . . sufficiently explain the discrepancies which are apparent in the results of the various experimenters which have been published.—'If the anterior fasciculi of the cord' observes Dr. Nasse, 'possess sensibility but only in a slight degree, the mere opening of the vertebral canal, and laying bare the cord must cause such a degree of pain as would weaken or destroy the manifestations," etc.*

All the nerves of the body, and especially those which preside over the functions of organic life, have been more or less tampered with to the torture, or slow miserable death of the animals; but Dr. Carpenter† has but little faith in the truthfulness of the deductions of the experimenters, if the following be any testimony:—"There is no good reason to believe that 'nervous agency' is essential to the processes of nutrition and secretion in animals, any more than to the corresponding processes in plants. This is a question which may be more certainly determined by *observation* than by any experiment which can be made. That they are very readily influenced by changes in the condition of the nervous system, is universally admitted; and it is the intimacy of this connection which has given rise to the idea of a relation of *dependence*, and which prevents that idea from being disproved. In order to cut off all nervous communication from any part of the organism—a gland for example—so violent an operation is required (involving no less than the complete division of the bloodvessels, on which a plexus of ganglionic nerves is distributed,) that it is impossible to say, that disturbance of the function may not be owing to the shock produced on the general system."‡ Dr. George Wilson says of the vital forces.—"They are a class of agencies extremely difficult to investigate, from their acting in living bodies, side by side with the forces found solely operating in dead matter; and from the impossibility of subjecting living beings to experiment without risking the destruction or derangement of the vital forces, by the unavoidable interference with their normal action, which experiment necessitates."§ In every other department of physiological inquiry, where

* *Todd and Bowman's Physiology.* Vol. I., p. 317.
† See (*d.*) Appendix.—Second Proposition.
‡ *Principles of General and Comparative Physiology.* By Dr. Carpenter, p. 209.
§ *Life of Dr. John Reid,* p. 51.

the mutilation of animals has been resorted to, there is the same unvaried round of discrepancy and error. In a brief essay like the present it is indeed difficult to give any idea of the extent to which this prevails by quoting examples; so that a few of, perhaps, the more striking blunders inseparable from a system so fallacious, may be taken as illustrative of what the highest authorities have adduced in their evidence against vivisection.

The physiology of vomiting, in various classes of animals, has for many years excited the ingenuity of experimenters. A reference to M. Colin's work on comparative physiology will give a faint idea of the number of animals sacrificed; though it will in this, as in other experiments, be impossible ever to know the exact number, considering that any one may experiment for himself, and but few venture to publish their conclusions or results. Magendie's essays in this line were always characterised by great cruelty. M. Colin designates them as "so seductive!" One of his many attempts was to cut out the stomach of a large dog while it was alive, and substitute in its place a bladder which he fastened to the gullet, in place of the stomach. By exciting vomiting in pouring an emetic solution into the veins, the contents of this bladder were discharged, as from the natural organ. Hear what an eminent writer says about this feat:—Magendie has inferred from his experiments, that it is only the contraction of the abdominal muscles and diaphragm which produces vomiting, and that the stomach has no share in the act. This physiologist, on this, as on other occasions, has not taken into account the various sources of error to which experiments on living animals are liable. He has not sufficiently considered or calculated upon the unnatural positions in which such experiments place the animals experimented upon, and which thus derange their natural operations.* Besides, the natural movements of the stomach have been often witnessed when accident or disease has left it exposed. L'Epione saw the organ contract in a man whose abdomen had been accidentally ripped open. This same Magendie, whose unenviable reputation for inhumanity and merciless punishment to all kinds of creatures, but especially those nearest to man in intelligence and sensitiveness, has called forth the remonstrances and the anger of many physiologists, had no high estimate of the practice which had gained him his name; for shortly before his death he advised his friends against conferring with vivisectors, frankly admitting that no medical man would con-

* J. Copeland, M. D., in Appendix to *Elements of Physiology*. By A. Richerand. London, 1829.

sult a surgeon or physician who obtained his knowledge from so uncertain a source, and one which would be sure to mislead.

Towards the end of the last century, M. Bremond, a great philosopher and scientific man of his day, and also a vivisector of some note, published some of his experiments in the transactions of the Imperial Academy of Paris. The elasticity of the lungs was the subject of his investigations. "I found," he says, "that having stabbed a dog in one side only, it could run about the house and howl."—and so would, I dare say, the clever philosopher had he been so undeservedly treated—"but," he goes on, "the air which the dog took in by the wound when it expired, was pressed out again by the wound when it inspired. Next, I opened the chest of a living dog, and there I saw that when the lungs contracted the chest dilated." Would the student who has studied the most simple outlines of physiology say that these were experiments likely to lead to any good result, or that they were anything but atrocious cruelties perpetrated by a man who had neither head nor heart. Ten thousand pities it is that science should bear the deeds of this and such like pretenders! Sir Charles Bell has no patience when speaking of this bravo of science.

Lower affirmed that, by tying a ligature on the posterior vena cava of a dog, he could produce dropsy in the belly, and that when the jugular veins were tied the head became dropsical. Hewson repeated these experiments many times, but always with a contrary result. Hunter's experiments on the veins of the intestines were not in unison with those of Sir Everard Home, Valsalva, Van Swieton, Pechlinius, Lower, Costæus, Morgagni, and others, but especially Drelincartius, in his "Experimenta Canicidia," spent many days and weeks in tying up the carotids of dogs, and for no obvious reason save that they believed some fable about a goat which was said to go to sleep when its throat was compressed, and waked up again at pleasure. The Prussian Philosopher, Kant, believed and reasoned on these errors. How many of the experiments of modern vivisectors have been as devoid of reason to guide them, and how many of them has had as little fruit?

The conscientious director of the Imperial School, at Alfort, in reviewing a long series of vivisections, has felt himself compelled to ask, "Is there one of these experiments I have described, which has produced for humanity any advantage that can compensate for the suffering they have occasioned? I have no hesitation in replying in the negative."

The late Professor Coleman, imbued strongly with experimental notions at the out-set of his career, furnishes us with an example. I quote from the "Life of Sir Astley Cooper,"

wherein that renowned surgeon says, "I was a better anatomist than Coleman. He was a better theorist than I, and we made the experiments together, which were published in his work on respiration. This was begun in the idea that mechanical obstruction in the lungs was the cause of death in drowning, and in hanging. But, as he went on, he was obliged to add, the want of change of blood. A multitude of experiments were made, some of which proved curious. Mr. Coleman had no sooner come to Mr. Cline's than he again engaged himself in studying the subject of asphyxia, and he made so many experiments upon cats and dogs, and killed such numbers of these animals, that a friend of his once declared he had blocked up Houndsditch."* The result of this unprovoked war upon dogs and cats was a mighty one to science—they were discovered to die for want of air![†]

Bichat, in speaking of the little value to physiology of reasoning by hypothesis, asserts that it is necessary to abandon it, since the experiments which should serve as a foundation for to deceive us.[‡] This man was a most zealous dissector of living animals.

Galen who so ably ridiculed the physicians of his time, and from their mode of treating diseases, styled them empirics, would find as good reason to deride the burlesque—but for their victims—painful philosophy of many of our own day who seek to learn the complex functions of life in man, by merely experimenting on rabbits, pigeons, ducklings, guinea pigs, dogs and cats, each or all, and then apply the very questionable results they obtain to his vital operations. What can be more fallacious when these results have to be modified in a thousand different ways before they can be even approximately compared with what takes place in the human species. Respiration, digestion, innervation, and many other functions, are very dissimilar in all these. Even when the higher animals are the subjects of experiment, physiologists err in their analogies, because they have not sufficiently made themselves acquainted with comparative anatomy and physiology, and because they wish to dive to the bottom of deep problems before they learn the nature of their superficies. Reaumur, observing digestion only on birds which have a strong muscular gizzard, came to the conclusion, because this organ was capable of grinding hard substances, that trituration was the essential principal of digestion. To study digestion as it is in man, what wisdom is there in experimenting upon a ruminant animal, with three or four

* *Life of Sir Astley Cooper, Bart.* London, 1843. Vol. I, p. 181.
† See (*e.*) Appendix.—Second Proposition.
‡ *Anatomie Generale.* Par Bichat.

stomachs to digest a vegetable diet, a carnivorous animal with a stomach adapted only for flesh, or a creature that feeds almost exclusively on grains? And yet we find that Sir Astley Cooper drew his deductions from experiment on the dog, a carnivorous animal, and applied them to man, an omnivore. When noticing digestion, I may call attention to the opposite results which vivisectors have obtained in their experiments upon it. A most inhuman man, a Dr. Brachet, divided the pneumograstic nerves in a dog, after allowing it to become ravenously hungry, and found that it had lost all desire for food. Dr. Reid, of Edinburgh, repeated the experiment several times, but without success.

Sir B. Brodie found that by cutting the vagus nerves, the flow of mucus secreted by the stomach was immediately checked. Dr. Reid's results disprove this. The vivisectionists who have thus sought to learn the functions of the stomach in animals, seem to have overlooked the serious shock which they gave to the other functions of respiration and circulation, and, in fact, to the whole body, by the destruction of such important nerves as these. Death generally took place by a slow asphyxia in a short space of time. Who can wonder, then, if the digestive process was subverted, or if evidence were unsatisfactory? Who could believe in the value of evidence so obtained? Magendie, thinking to improve upon Brodie, who had cut these nerves in the neck, cut them in the chest. Is there any reason to suppose that the shock was less, or that the operation would be more successful? None whatever. To prevent suffocation, another investigator opened the windpipe, by which means life was preserved a day or two longer, but the truth was no nearer; for it was not only to keep off dissolution, but to find out the modifications imposed upon digestion that these proceedings were instituted. Blainville having cut the vagus nerves in pigeons, gave them grains to eat, and on opening them after a certain time, found that these were still in the crop unchanged. From this he concluded that digestion was suspended. What a mistake! He quite overlooked the fact that owing to the paralyzed condition of the œsophagus, the grains could get no further than the crop, and though the gizzard and stomach may have been intact, they never had a chance of performing their work.

Legallois* divided the vagus nerves in ginea pigs, and ascertained that the stomachs retained all the food put in them. The fact was that he had paralyzed that organ and whether or not there was secretion, it could not pass on the food to the in-

* *Experiences sur le Principle de la Vie*, p. 218, *et seq.*

testines. Dupuy made a section of these nerves in horses and sheep, and though he scarcely found any change in the aliment contained in their stomachs, yet M. Colin can see no proof that their digestive offices were suspended.* Brodie, Magendie, Leuret and Lassaigne, entered upon another course of experiments equally unsatisfactory and debatable. A host of minor vivisectors entered the list, but the only valuable facts relating to this process were obtained from cases of accident or malformation in the human subject, as in those of Alexis St Martin, Catharine Kutt, and that reported by Busch. Blondlot cruelly made fistulous openings into the stomachs of animals, but the results were not so much to be relied upon as those derived from man.†

Absorbtion in the stomach was for more than a quarter of a century a hard contested point among physiologists. Some contended that they had seen absorbtion take place after section of the vagus nerves, in opposition to those who denied the possibility of such a circumstance, and that the faculty of absorption was independent of nervous influence. The fact is, that the stomachs of carnivorous animals are constructed on a certain principle, and those of herbivorous animals on a different plan; the structures of the first possess conditions which facilitate absorption, while those of the second are constructed as if to resist it. The dispute might have lasted for ages, had it not been discovered that one set of experimenters operated on the stomach of a dog, which has strong absorbent power, and another set carried out their investigations on ruminants, and more especially on the horse, the stomachs of which absorb but feebly.

But there is no end to these and like examples; so that one can scarcely wonder if an ardent vivisector like M. Longet should come to the conclusion, after many long years of painful meddling with, and slaughter of, unlucky creatures, that "experiments on animals of a different species, so far from leading to useful results, as regarded human beings, had a tendency to mislead us. In seeking to benefit mankind by vivisections, it would be necessary to have recourse to pathological facts, founded on experiments on *human* beings." M. Colin announces "That experiments on animals, however well conceived and directed though they be, do not give all expected of them, unless they be followed with extreme care, otherwise the observations will be inexact or incomplete, and at the best they will only lead to insufficient results, in part false;

* *Traite Comparative.* Vol. 1, p. 580.
† See (*f.*) Appendix.—Second Proposition.

and cannot serve as a basis for healthy reasoning or rigorous theories." The celebrated Mr. Abernethy, in noticing some of Spallanzani's researches, has some apt thoughts regarding vivisection. "There is yet one point which I feel it a duty to advert to. Mr. Hunter, whom I should not have believed to be very scrupulous about inflicting suffering upon animals, nevertheless censures Spallanzani for the unmeaning repetition of similar experiments. Having resolved publicly to express my own opinions with respect to this subject, I choose the present opportunity to do so, because I believe Spallanzani to have been one of those who have tortured and destoyed animals in vain. I do not perceive that in the two principal subjects which he sought to elucidate, he has added an important fact to our stock of knowledge; besides, some of his experiments are of a nature that a good man would have blushed to think of, and a wise man would have been ashamed to publish; for they prove no fact, requiring to be proved, and only show that the aforesaid Abbé was a filthy minded fellow The design of experiments is to interrogate nature; and surely the enquirer ought to make himself acquainted with the language of nature, and take care to propose pertinent questions. He ought further to consider the probable kind of replies that may be made to his inquiries, and the inferences that he may be warranted in drawing from different responses, so as to be able to determine whether, by the commission of cruelty, he is likely to obtain adequate instruction. Indeed, before we make experiments on sensitive beings, we ought further to consider whether the information we seek may not be obtainable by other means. I am aware of the advantages which have been derived from such experiments, when made by persons of talent, and who had properly prepared themselves. But I also know that these experiments tend to harden the feelings which often leads to the unnecessary and inconsiderate performance of them. Surely, we should endeavor to foster and not to stifle benevolence, the best sentiment of our nature, that which is productive of the greatest gratification and advantage both to its possessor and to others."

Dr. Elliotson, as a physiologist, expresses a similar opinion in his work on that subject.* Alluding to the numerous experiments made by Dr. Brachet—whom we have already noticed—to discover the functions of the ganglionic system of nerves, "I cannot refrain," says he, "from expressing my horror at the amount of torture which Dr. Brachet inflicted upon so many unoffending brutes. Nearly, or quite two hund-

* *Human Physiology.* By J. Elliotson, M. D., p. 449.

red, must have suffered under his hand. I hardly think that knowledge is worth having at such a price, or that it was ordained that we should obtain knowledge by cruelty. I care nothing for killing a brute outright without pain. It is then as it was before it was born—feels no loss, and escapes all further chance of suffering. Vivisection may be justifiable in some cases. But, before an enquirer commences an experiment of torture, he ought to be convinced of its absolute necessity; that the investigation is important, and the means indispensable, and also that he is master of the existing knowledge on the subject, and qualified to operate and to philosophize upon the results. He should proceed to the task with the deepest feelings of regret. I do not wish to make a parade of feeling, but to torture animals unnecessarily is a most cowardly and cold-blooded act, and in my opinion of the utmost depravity and sin. A course of experimental physiology, in which brutes are agonized to exhibit facts already established, is a disgrace to the country which permits it. My esteemed French friends will pardon me, but I fear that in France there is, among many, too little repugnance to vivisection; and I am sure that the following experiment would have caused Dr. Brachet to be blackballed in any respectable society in England; for a physiologist was blackballed at the Royal Society from the horror excited by an account read just before; of an experiment in which rabbits heads were crushed; though, on reflection, it was found that these experiments were unattended by pain, and he was honorably elected on an early occasion. 'I inspired' says Dr. Brachet 'a dog with a great aversion of me by plaguing or inflicting some pain or other upon it as often as I saw it. When this feeling was carried to its height, so that the animal became furious as soon as it saw and heard me, I put out its eyes. I could then appear before it without its manifesting any aversion. I spoke, and immediately its barkings and furious movements proved the passion which animated it. I destroyed the drums of its ears, and disorganized the internal ear as much as I could. When an intense inflammation had rendered him deaf, I filled up his ears with wax. He could no longer hear at all. Then I went to his side, spoke loud, and even caressed it without his falling into a rage—it seemed even sensible of my caresses.' Nay, Dr. Brachet repeated the same experiment upon another dog, and begs to assure us that the result was the same. And what does all this prove? Simply, that if one brute has an aversion to another, it does not feel or show that aversion when it has no means of knowing that the other brute is present! I blush for human nature in detailing these experiments; and I shall finish by informing my readers that the memoir, contain-

ing this and many other horrors, obtained the physiological prize for the French institute in 1826. It need not astonish any one to hear this worthy French doctor jocosely relating how, when he was a house pupil at the Hotel Dieu, one of his colleagues regaled the others with a dinner of cats which he had experimented upon in their life-time, and the next day sent the skins, bowels, &c., to the recipients of his hospitality, in order to let them know what they had eaten."*

Sir Astley Cooper and John Hunter have been held up as men who greatly benefitted society and science by their experimental researches on the lower animals. In vain have I carefully sought in their writings for any verification of this result to mankind from their living dissections. Sir Astley Cooper's error in investigating digestion on the dog, and drawing his inferences regarding it as if it had been pursued on a human being, I have already noticed. He often forgot that there are many experiments performed on the lower animals which can never be of any service to man, and that a little forethought would save the pain which is inflicted so needlessly. What can evidence this better than his experiments to discover the functions of the membrana tympani, and the effects of a rupture of it on dogs. "This had been made the subject of experiment upon the lower animals, but without success, from the difficulty of ascertaining, with any correctness, the results produced on their faculty of hearing." The most curious circumstance connected with this failure was, that when much time had been thrown away in attempting to induce a certain degree of deafness in poor brutes, he looked around him, and found innumerable cases ready to hand, in his own species, without being required to resort to torture.† One of the achievements he made in operative surgery was said to be founded on his vivisectional experience, namely, the cure of aneurism by ligature of the artery. The effect of tying arteries was known before his day, and the success which attended his essays in treating this particular disease, was owing far more to his profound knowledge of human anatomy, his boldness and dexterity, than to any teaching derived from ligaturing the blood vessels. By other means than this he had satisfied himself of the possibility of success, and pathological observations on man were not the least of these.‡ His grand operation for aneurism of the anterior aorta owed nothing, I believe, to the vivisection of brutes. Before he would venture to operate on a living human being, he adopted the expedient of rehearsing the most difficult part of his task on the dead

* Dr. Elliotson. † *Life.* Vol. II., p. 3.

‡ See (*g.*) Appendix.—Second Proposition.

body, and the intense anxiety with which he waited for the result, will show the doubtful value this operation at first had in his estimation.* Nowhere does he attribute his skill in performing this feat to dissecting live animals. The greatest achievement of his life—his Treatise on Hernia—does not appear to have been at all indebted to experiments on dogs or cats for the remarkable manner in which he describes its nature and cure. Indeed, I am inclined to think that very many of his experiments on live creatures were totally unproductive of any results whatever, and others were so meagerly so that they were not worth mentioning. His writings furnish us with no facts in regard to this; may we not, therefore, assume that the results of his very many years of slaughter, were doubt and conjecture?

His biographer, though a strong advocate for vivisection, in summing up the character of Sir Astley Cooper and John Hunter, concludes by the following:—"In examining the comparative rank of each of these distinguished men, it will be found generally to have depended upon the extent of the anatomical knowledge of the individual:—John Hunter, the greatest philosopher, and Sir Astley Cooper, the most scientific and enterprising surgeon the medical profession of this country has ever had to boast of. Both derived their fame from one and the same origin, and it is equally certain, even at the present time, that whoever would wish to emulate their eminence must base his claims to distinction upon knowledge emanating from the same source—dissection of the dead" †—a rather different opinion to that of Pecquet, a notable vivisector and nothing more, who described anatomy as "a mute and frigid science," probably because the yell of torture and the warm life blood pleased him better.

The experiments of John Hunter were many, and were very painful to the dumb creatures he tortured, but I am sure the most sanguine vivisector would never attribute his discoveries to vivisection. He was indeed a most profound and unwearied anatomist, as well as a keen observer, and his successes, brilliant as they were, required no more than his anatomical genius and great knowledge of disease. I cannot trace in any of his writings mention of his having relied for great results upon operating on live dogs or other animals, but I find everywhere that he esteemed clinical observation and *post-mortem* examinations the most certain means of attaining surgical distinction.

It is particularly worth noticing the way in which men, who were never satisfied unless trying experiments on animals for

* Op. cit. Vol. II., p. 448. † Op. cit. Vol. II., p. 205.

the greater part of their lives, began to forsake a pursuit so unnatural when age commenced to make them reflect. Were it so greatly needed for the welfare of their species, or did the ends justify the means, surely they would not so readily relinquish a method of seeking the truth which until now they had so eagerly employed. Yet such is the fact with many. I have already cited some, and Astley Cooper, if his biographer informs us correctly, is no exception. "Towards the end of his days he began two subjects of physiological interest, which were never made public. His experiments in the first place did not appear to him to furnish results sufficiently interesting or satisfactory for publication. In the second case he abruptly discontinued his enquiries for a *remarkable* reason. It was necessary for his object that a large number of animals should be experimented upon, and Mr. Parmenter, who was engaged in assisting him in them, informs me that he became afraid, lest from their nature he should be accused of cruelty towards the subjects of his experiments, and hence desisted from the prosecution of this pursuit and turned his attention to the subject now under consideration"*—(Diseases of the breast.) The experiments alluded to were intended to determine certain questions relative to the functions of the brain. These were the last attempts at living dissections of a man who would not have hesitated in his younger years to sacrifice any number of animals without, I fear, much regard to pain.

Who that has read the life of Dr. John Reid, can soon forget the passage, in which we are told, when this good able man was in his last days, and suffering the most fearful agony in that region of his body endowed with those nerves, the functions of which had cost him so very much time to investigate, and the dogs he instituted his researches upon so much pain, that he often said—"This is a judgement on me for the sufferings which I inflicted on animals."† Does it not sound like remorse, and the honest confession of great cruelty practised without an adequate compensation? And yet this great physiologist was by far the most considerate and merciful in the prosecution of his experiments of any other worker I find mentioned, except, perhaps, Sir Charles Bell. The avoidance of apparently useless pain was generally his aim, though he afterwards acknowledged the thoughts of scientific fame had carried him sometimes beyond this limit; the introduction to one of his essays on the eighth pair of nerves will show this. "In stating the experiments, I shall enter more fully into the details than many may think necessary, as it appears to me,

* Op. cit. Vol. II., p. 443.
† *Life of Dr. John Reid*, p. 179.

that it is an object of essential moment to mention all the circumstances under which any important experiment is performed in physiological investigations; . . . . . and I am convinced, that if this plan had been more fully followed, many a controversy might have been avoided, *as well as much animal suffering spared*. It may appear to some that I have repeated many of those experiments with unnecessary frequency, and a wanton sacrifice of animals. But I naturally felt diffidence and distrust in the accuracy of the results I obtained, when opposed to those of more experienced observers; and it was only after repeated and careful examination of the phenomena, that I could feel myself justified in calling these in question. It is also sufficiently obvious, that nothing is more injurious to the progress of science than hasty and partial observations; and I was anxious to avoid, as far as I possibly could, adding to that mass of conflicting evidence which there is already so much reason to deplore. Besides, as every false observation requires additional experiments for its refutation, I felt that, with less extended opportunities of witnessing the phenomena under examination, I must incur a greater risk, not only of throwing obstacles in the way of the progress of truth, but also of occasioning *a useless infliction of pain*."* There is honesty and truth in this, and there is an appearance of that mercy which should ever be dominant in the mind of man when the feelings of his humbler companions are at stake. I much doubt if many experimenters of the present day could make such a conscientious avowal as this; and yet it did not save him from the pangs of regret when he looked back, and thought only of the torture he had been guilty of.†

Dr. Carpenter, than whom we could scarcely have a higher authority on the subject, in reviewing the various means by which physiologists are to seek for knowledge concerning the vital operations in living beings, very clearly demonstrates the value of experimentation.‡ He says:—"The chemist, when desirous of establishing to which of the ingredients in a given mixture a particular effect is due, places each separately in the conditions required to produce the result; but the physiologist finds that the attempt to insulate any one organ, and to reduce the changes performed by it to definite experimental investigation, necessarily destroys, or considerably alters those very conditions under which alone its functions can be normally performed. Take away an important and essential part of a

* Anatomical, Physiological, and Pathological Researches. By Dr. John Reid.
† See (A.) Appendix.—Second Proposition.
‡ See (i) Appendix.—Second Proposition.

living being, and it ceases to exist as such; it no longer exhibits even a trace of those properties which it is our object to examine; and its elements remain subject only to the common laws of matter. We cannot, like the fabled Prometheus of old, breathe into the lifeless clay the animating fire; we cannot by a judicious and skillful arrangement of elements, combine them into new and artificial forms, so as to produce new and unexpected phenomena; and almost all our knowledge of the laws of life must be derived from observation only. *Experimentation* can conduct us very little further in this inquiry, than the determination of the dependence of the functions upon one another, and upon the external agents, heat, light, &c., by the action of which upon the organism the phenomena of Life are produced. But a judicious and careful system of observation will almost supply the place of experiment; for the ever-varying forms of organised beings by which we are surrounded, and the constantly changing conditions in which they exist, present us with such numerous and different combinations of causes and effects, that it must be the fault of our mode of study, if we do not arrive at some tolerably definite conclusions as to their mutal relations. In the language of Cuvier, the different forms of animals may be regarded as so many kinds of experiments ready prepared by Nature, who adds to or deducts from each of their different parts, just as we might wish to do in our laboratories, showing us herself at the same time their various results."* And in another part of this invaluable work on physiology, he insists that "*Observation alone* of the vital phenomena of the lower animals, will reveal what only could be determined in man by experiment."†

I have endeavoured in the foregoing quotations and examples, selected from a few sources, to show how little dependence can be placed upon the deductions drawn from the experiments of vivisectors, and for the simple reason that truth can rarely, if ever, be so elicited, because of the complex nature of the vital functions, the difficulty of isolating them from other influences, the perturbations which their attempted isolation set up in the whole system, and which only too often give highly exaggerated pathological conditions, instead of those tranquil manifestations of vitality which we know to be their normal state. I have diligently and impartially sought for information through a large library of books, devoted, in great part, to the writings of experimental physiologists; and after all my search, the opinion to which I would not have listened

* See (*k and finally*) Appendix.—Second Proposition.

† *Principles of General and Comparative Physiology*. By Dr. Carpenter, pp 4, 204.

some years ago, comes with tenfold power, and with many of the very highest authorities, I am obliged to admit that the practice of dissecting living animals for the general purposes of science, is except in the most limited degree neither necessary or justifiable.

Nothing is so obvious, in scrutinising the labors of vivisectors, as the fact that *nearly all* were cutting and puncturing, burning and pinching structures or organs to discover their healthy functions, the anatomy of which, and of their relation to each other, they were entirely ignorant of. What a flood of light is thrown on the mechanism of many functions, by the untiring industry of the anatomist with his microscope—functions which have baffled for years the revolting interrogations of the inquisitor's chisel and scapel! We shall never arrive at anything like a true knowledge of the functions of the brain and spinal cord, until we are perfectly acquainted with their minute structure. Other mooted points in experimental philosophy will only be solved by this means. How much suffering would have been spared numberless creatures, had vivisectors, when studying the physiology of vomition, only studied on the dead body the anatomical peculiarities of the various structures called into play for that purpose? Would not the structure of the stomach alone explain why some animals should be able to perform that act with ease, of which others are quite incapable. Bichat ridiculed the idea of employing the microscope as a means of ascertaining the true nature of many functions. He little knew that its revelations were of far more value, than the thousands of fruitless experiments he inaugurated in suffering upon all kinds of creatures, and that it would quite upset many of the conclusions which he had purchased so dearly.

With regard to comparative physiology, Dr. Carpenter has already shown its importance in the role of aids to decipher the laws of nature. Comparative anatomy has been too little regarded by experimenters; hence their experiments, besides being needless, are faulty, many of them, to the last degree. Cuvier was conscious of this when he said, "Nature seems to have supplied the means whereby we learn that which experiments on the living body never could furnish. It presents us in the different classes of animals, with nearly all possible combinations of organs; it exhibits them combined two by two, three by three, and in all proportions. There are none but have some description of organs by which they are made familiar to us; and it only suffices to examine closely the effects produced by these re-unions, and those which result from their partial or total absence, to deduce very probable conclusions

as to the nature and use of each organ and of each form of organ."*

Thus, in rising from the simplest to the most complicated animal form, we are made acquainted with the functions of organs in a far more satisfactory manner than if we rudely attempt to expose them by the knife, and amid struggling and perverted action, imagine we are actually witnessing what goes on when nature reigns undisturbed. As well might a stranger attempt to describe the domestic and political institutions of a people, as they existed during peace, were he suddenly brought among them when all was tumult and rebellion.

The teachings of pathological anatomy are most instructive, and when, during life, the diseases which afflict vital organisms are closely observed, and the varying changes and complications are duly noted, no experimentation can equal the results to be obtained by an examination of the morbid appearances after death. To mark the traces left by disease, the changes which it has produced, the peculiar functional disturbance which accompanied these changes—all this furnishes most valuable instruction and gives results which the vivisector cannot emulate, but which he very needlessly tries to repeat.

How often does disease present itself to us, bearing, as it were, the form of an experiment by nature! How much can the habit of observation teach, without the wilful infliction of pain on those men or animals which, by disease, come into our hands to be relieved! Hippocrates observed the peculiar crossed function of the brain when the skull was injured, and this organ involved. He remarked that, on the injured side, convulsions of the corresponding part of the body take place, and paralysis of the opposite side. Hydatids in the brains of sheep also testify, by the symptoms they produce, to this opposite action. These were noticed long before vivisection attempted to repeat their effects.

How frequently do we find injuries of the spinal cord teach us all that experiments can! Have we not loss of sensation when the posterior portions are damaged, loss of motion when the anterior aspect has sustained injury, and hemiplegia when the lateral tracts are the seat of disease? What more than a fracture or dislocation of the upper cervical vertebra can prove the functions of this part of the spinal cord? In all the experiments to prove the cause of the heart's sounds, have we anything more conclusive of the production of the second sound than the permanent patency of the aortic valves, which is a consequence of disease. Do not the muscular fibres of the heart, by their length and disposition, betray their combined action

* *Anatomie Comparee*, 2d Edit. Vol. I, p. 17

in the contraction and dilatation of the organ? Goodwyn thought oxygen in the arterial blood was the cause of the regular succession of the heart's action, and its absence as a cause of asphyxia. Brown-Sequard opposed this view, and affirmed that carbonic acid is the special stimulant to its movements. They both forgot that the heart will act in vacuum, sometimes even for days, after its removal from every apparent vital influence. We also recognized the rhythm of its beats by those accidents or malformations which exposed it many years before it was fashionable to mutilate living animals for this purpose. Destruction of the epiglottis by disease might have convinced vivisectors that this cartilage was not absolutely indispensible to swallowing. The obliteration of large blood-vessels during the progress of a malady have long ago conclusively shown that the value of anastomosing branches in carrying out the circulation of the blood is of the very highest. What more did Hunter's and Cooper's experiments prove? The insensibility of the substance of the brain, of the bones, tendons, and cartilages, were well known in the course of accidents and amputations, long before Haller and his school began their experiments to demonstrate these. What better facts have we regarding vital operations than many of those which are elicited by the humane practice of surgery? No experiments on the lower animals are half so conclusive or so useful to mankind.*

* Dr. Wilson in his own beautiful way, while opposing the general practice of vivisection, points out in simple language the merits of pathological observation. He writes: —"Further it is not only in the pages of death, but also in those of disease, that the history of life is written. Disease is the perversion, rather than the reversion of health. The sick body is not deserted by its natural or normal forces, and possessed by unnatural morbid ones; but the forces are working wrongly, some too feebly, others too powerfully, so that the nicely balanced equilibrium of the opposing agencies in which health consists, is overturned. The sick man's frame is like a clock keeping false time, not because any new forces have usurped the place of cohesion, gravity, elasticity, or inertia, and hold back or push on the hands of the dial; but because the altered length of the pendulum, or the diminished elasticity of the spring, or the increased friction of the pinions, has changed that relation between the weight, inertia, and momentum of the component parts of the machine, which is essential to its being a true chronometer. And exactly, as the movements of certain portions of an engine can be best seen when it is moving slowly, and the movements of certain others when it is moving swiftly, so the characteristic actions of living organs are often mostly surely ascertained by watching them when morbidly slow, or rapid in the Action. The pantings and convulsive struggles of a sufferer from Asthma, show most vividly the power of the muscles by which we breathe. The throbbing pulse of high fever, exaggerates in a striking way the natural action of the bloodvessels. The sickening palpitations of the invalid from heart-disease best demonstrate the use of the valves which in him are deranged. The cold and powerless limbs of the paralytic teach the true use of the nerves, which are the seat of his malady. Nor is there any disease which does not carry with it a lesson as to the nature

Those freaks of nature—monstrocities—seem in many instances as if ready prepared experiments, fruitful in conclusion to the scientific observer. So much so, indeed, that Geoffroy St. Hiliare declares that they are a series of natural experiments, wisely prepared, where the causes of those errors which so frequently modify the results of vivisectional researches are found all but abrogated*

I have hitherto omitted to speak of another branch of animal torture, which, though it cannot properly be termed vivisection, yet belongs to that fashion of experimenting, and may be even more productive of suffering to the lower creatures than live dissection. I mean the administration of substances which are either known to be active poisons, or are possessed of qualities which it is necessary to test before they can be applied for the relief of mankind. Only on man and the lower animals can this be done, and to prevent the more valuable sacrifice of human life the latter are selected, and the symptoms which particular drugs produce before death, with the *post-mortem* changes they induce, are noted as guides for the pathologist, the theraputist, and the chemist.

One of the great faults of this testing the properties of various substances on particular animals, arises from that very cause of error which I have already alluded to as interfering much with the experiments of vivisectors—the difference of organization. Whether this has appeared to many of those therapeutists and druggists whom I have known, and those whose experiments I have read, it would be needless to say; for there remains the fact, that, regardless of their great dissimilarities, the dog, rabbit, horse, cow, and goat have been subjected to these trials, which of course, when the results were applied to the human species, could not but be considered unsatisfactory. And beyond all this, there seems to lurk a substratum of cruelty which it requires very much in the shape of benefit to diseased humanity to palliate. What service can be rendered to mankind by administering to a cat or dog some powerful corrosive poison in large doses, and watching the agonising throbs of the

of the function which it disturbs. Again, it is by its own living actions that the diseased body cures itself, if it is cured at all. The assuaging of a fever, the disappearance of a dropsy, the closing of a wound, and every other healing act, though it be but the departure of a headache, or the stopping of a leech bite, is the putting forth of a living power most instructive for the physiologist. He must, therefore, haunt the hospital, watch at the sick man's bedside, stand by the operating surgeon, trace every step of recovery, and every stage of decay; and, when death has done its worst, attend with all the appliances of his science, to connect the morbid appearances of the dead body with the symptoms of the living sufferer. *Life of Dr. John Reid*, p. 52.

* *Historie Generale et Particuliere des Anomalies de l'organisation.* Paris, 1836. Vol. III, p. 589.

suffering beast until it dies, when already our private and hospital surgeons, by painful experience in the cases often brought before them, are perfectly acquainted with its action?

If an antidote be discovered to some metallic poison, why cannot an agent be found which will neutralise its irritant qualities in the mortar or retort before experimenting to seek the one while the animal's stomach is being destroyed, and creature is enduring great torture. And what is the use of giving a dog poison until he is killed, and then drawing inferences with regard to the dose which will cause death in man, when it is known that both are so differently constructed, apart from difference of size, that the analogy cannot hold good? We know that the different classes of animals are very differently affected by many medicines. A few grains of tartar emetic causes almost immediate vomiting in dogs, whereas the same drug, even when given in doses of several ounces, has scarcely any physiological effect on horses. Aloes, the most uniform and convenient purgative for horses, is uncertain and irregular in its action on cattle, but purges dogs in doses of nearly a drachm, or eight times as much as is given to a man. Opium, strychnia, and æther also afford good illustrations of the different effects which the same medicine has on different classes of animals. Horses are particularly liable to superpurgation by medicines, and most substances which act as an emetic for men and dogs produce a sedative effect when given to horses in sufficient doses. Facts of this nature might be multiplied, *ad infinitum*.

Many of the experiments appear to be devised without special regard to utility, and leave no record save of the agony or death of the animals, in a way that cannot be satisfactory to those who hold the infliction of pain and death deserving of some benefit to mankind. We must remember, too, that many substances act differently when given to an animal in health, than when disease is present, and that this fact has been proved by the daily practice of the physician or surgeon.

Need I say that in these experiments there is almost as much contradiction and uncertainty as we have seen to exist with those of live dissections. The cruelty is certainly not a whit less. Poisoning by arsenic, corrosive sublimate, sulphate of copper, or even lime, cannot be described as terminating in painless deaths; and the exhibition of anæsthetics, which are sometimes mercifully employed by the vivisector to disguise the pain, are here forbidden, because the external manifestations of these irritant poisons would be suppressed.

Having thus stated the charges brought against vivisection, and supported them by examples, as well as by the opinions of

men who stand foremost as physiologists, and whose authority in this department is universally acknowledged, it would only be doing justice to what is apparently a difficult question, to hear what some of the vindicators of this practice have to urge in its behalf, and to criticise their statements. Though many of the advocates are scientific men, their apologies are puerile in the extreme. Others are masked, and are intent only on exhibiting the system in its most pleasant aspect. Of course, in doing this they do not give the whole truth; indeed, they seem to fear its being made known, and resent inquiry, as if they dreaded or were ashamed of the consequences. What shall we say to the following extract from an article in a weekly reviewer?*—"The present plan of experimenting on live subjects must stand or fall by its utility. If it can be shown that by the sufferings of two or three hundred chickens or rabbits per annum science can be put in a position to lessen the agonies of a countless number of men and women writhing under the inflictions of disease, not many persons would be found to place the interests of a few fowls, of which the majority are doomed to a violent death for human convenience, above an incalculable gain to unborn generations of our race. We should not rate highly the benevolence of those lovers of poultry who for the sake of saving a few ducklings from the pain caused by the anatomist's knife, would consign countless multitudes of their own kind to greater anguish. If no argument of necessity can justify us in putting animals to pain, no argument can justify us in putting them to death."

To kill is one thing; to torture is quite another. Under the butcher an ox dies, and his sufferings are at a minimum point, and certainly less than those of natural death—under the vivisector they are at a maximum point generally. Besides so far from it being true that only these animals are doomed to be sacrificed to appease the gods who govern the acts of vivisectors, there is the evidence of these men to prove that thousands of dogs, cats, horses, and other beasts, have been doomed to the most inhuman tortures the ingenuity of man could conceive, and the results so far from relieving diseased mankind, or even improving or extending scientific knowledge, have shocked the moral nature of the first, and retarded or confused the second.

Bransby Cooper, the editor of the Life of Sir Astley Cooper, and the gentleman who thought it a remarkable reason that his talented uncle should abstain from a series of experiments, because they were too cruel for his accustomed hand, says in that work† that the most eminent men of the medical profession

* *The Athenæum.* July 16, 1864.
† Vol. I., p. 144.

have practised vivisection, and that it seems almost essential to the acquirement of the higher orders of surgical and physiological knowlege. "By this means only are theories proven erroneous or correct, new facts brought to light, important discoveries made in physiology and sounder doctrines, and more scientific modes of treatment arrived at. Nor is this all; for the surgeon's hand becomes tutored to act with steadiness, while he is under the influence of the natural abhorence of giving pain to the subject of experiment, and he himself is thus schooled for the severer ordeal of operating on the human frame. I may mention another peculiar advantage in proof of the necessity of such apparent cruelty, that no practising on the dead body can accustom the hand of the surgeon to the physical phenomena presented to his notice in operations on the living. The details of the various differences which exist under the two circumstances need hardly be explained, as there are few minds to which they will not readily present themselves." Now, it is exactly the absence of these details which might militate against their arguments, that renders the motives of vivisectors so suspicious. With regard to the practice of living dissections seeming almost essential to surgical and physiological knowledge, I have in the preceeding pages given a few of the opinions of men of much greater weight and experience in this line than Bransby Cooper as to their value in physiology, which is shown to be extremely doubtful. There is, I am certain, no eminent surgeon of the present day who would not stand aghast at, or treat as a joke, the assertion, that it was only by operating upon the inferior animals that real surgical skill could be obtained; and that the man who was most expert at amputating the limbs of men, had gained his proficiency by removing those of dogs and cats; or the professor who was celebrated for such plastic operations as forming a new nose from the texture of the forehead, had spent years in learning this on pigs, dogs, or ducklings. The thing is too ridiculous; and, besides, we have distinct proof that surgeons entirely and indignantly repudiate such a source of skill. In what those other advantages he refers to consist the inevitable absence of details leaves his readers to conjecture. If they cannot be found in such records as those he has published, we may be allowed to doubt their existence.

Dr. Brundell, whose evidence appears in the above work, and also in the "Times" for August 1863, is one of the most eloquent of those writers who attempt to procure a license for wholesale vivisection. He says: "Those who object to the putting of animals to death for a scientific purpose do not reflect that the death of an animal is a very different thing from

that of a man. To an animal, death is an eternal sleep; to man, it is the commencement of a new and untried state of existence. . . . Shall it be said that the objects of physiological science are not worth the sacrifice of few animals? Men are constantly forming the most erroneous estimates of the comparative importance of objects in this world. Of what importance is it now to mankind whether Antony or Augustus filled the Imperial chair? And what will it matter a few centuries hence whether England or France swept the ocean with her fleets? But mankind will always be equally interested in the great truths deducible from science, and in the inferences derived from physiological experiments. I will ask, then, whether the infliction of pain in the lower animals in experiments is not justified by the object for which these experiments are instituted, namely, the advancement of physiological knowledge?" It is but a sorry excuse to advance on behalf of a system which does not decimate a *few* animals, but uncounted thousands, to say that the death of a creature is a very different affair from that of a man, it being an eternal sleep to the one, and the advent of a untried state of existence to the other. What matters it to either, so far as pain is concerned, what happens after death? Is it because death is an eternal sleep to all beneath man in organization, that torture may be resorted to, and justified in the eyes of humanity, for putting these creatures to sleep. Because the brutes go to an eternal death, is that a reason why man, who has an untried state of existence before him, should inflict the most grievous injuries on them during their lives? Certainly not; and neither the laws of God nor man will justify such a silly argument. It may be necessary that an animal should die, but it does not follow that it may be tortured to death, and certainly not *because* death consigns it to an eternal oblivion. How does an admired author meet this argument of the Doctor's? In the "Guardian," No. 61, he begins:—"I cannot think it extravagant to imagine that mankind are no less, in proportion, accountable for the ill use of their dominion over creatures of the lower rank of beings, than for the exercise of tyranny over their own species. The more entirely the inferior creation is submitted to our power, the more answerable we should seem for our mismanagement of it; and the rather, as the very condition of Nature renders these creatures incapable of receiving any recompense in another life, for their ill-treatment in this."

M. Colin is less humane in his apology. He says:—"There is, we are convinced, no more inhumanity with experimenters, than there has been with those nations of antiquity, where so

many slaves became, in the middle of circuses, the prey of ferocious beasts, for the amusement of spectators." This needs no more allusion than just to show the estimation in which some vivisectors hold their occupation, and the examples they would seek to justify it by.

Legallois is of the opinion that "the physiologist who sacrifices an animal with the object of instructing, is surely more excusable than the hunter who kills so many inoffensive animals to feast on, or than the epicure who mutilates or gives them mortal maladies, in order to render their flesh more delicate." To this we may reply that the hunter, who seeks to kill animals for food, is mercifully disposed to cause their instant death; and the epicure, if found guilty of cruelty by causing prolonged pain to the creatures destined as food for him, would certainly deserve the reprobation of mankind, and might even be made amenable to legal restrictions *

In the official report of the Commission appointed by the French Government to inquire into the subject of vivisection, and which was read before the Imperial Academy of Science of France, on the 4th of August 1862, the reporter, glad to avail himself of any opportunity to justify the abominable practice, and but little pleased with England for its crusade against vivisectors, points to our prize fights among men, and to the, perhaps, more brutal dogfights as a proof that there is more brutality in the world than living dissections. Our French friends must remember that such things are only patronised amongst the lowest and most degraded of our idle people; that they are strictly forbidden, and are punishable by law; and that to place vivisection on a level with these vile amusements, is, at once, to deny its right to be regarded in any other light than as a crime, and its devotees on a par with the dregs of human kind.

"But," says another pleader, "there is no cruelty inflicted, nor yet pain, beyond that which is unavoidable in the examination of certain functions; and often chloroform is administered to deaden sensation when the exhibition of feeling on the part of the animals is not required in the experiments" It would be as unjust as it would be unwise to brand everyone who has had recourse to experiments as men who were regardless of the pain they might cause in the course of their researches, or to say that reckless inhumanity prompted them to neglect means which might have palliated the sufferings of their victims. Unfortunately, however, the history of physiological science is replete with as foul examples of inhumanity to the lower

* Plutarch observes—"If we kill an animal for our provision let us do it with the meltings of compassion, and without tormenting it."

animals, as could be found even among the most depraved wretches who gain a livelihood by their brutal exhibitions. To read of them, makes one doubt that vivisectors possess any humanity at all; or if they have ever had this "weakness," that they are able to keep it. Cruelty has attended the path of the mutilator from the earliest days up to the present, and it was to avoid the scandal to which ill-defined experiments gave rise, that in the sixteenth century, the Italian schools, presided over by Fallopius and Eustachius, gave opium to the animals they prosecuted their anatomical and physiological researches upon. Later experimenters have not been so scrupulous or so careful, and the few published accounts of demonstrations—a few out of thousands unpublished, or even unrecorded—testify to the utter want of humanity of the operators in too many instances. The French, especially, have distinguished themselves in the most unenviable way, and do not mind about concealing it; but trumpet forth their exploits, as if they merited praise for their hardness of heart in dallying over operations which would sicken the most callous butcher. Magendie's experiments are nearly all of them replete with most dastardly symptoms of cruelty. I have, much against my own desires, already enumerated a few of these, but they all fall short of others, which I think are unfit for publication. Who has not, however, been moved with emotion—whether of anger or pity, or a mixture of both, it would be hard to tell—as he read of the merciless horrors which attended one of this *savant's* class demonstrations, when a poor dog was the subject of an experiment on the spinal nerves. In vain did the unpitying man endeavor to lay bare the roots of the vertebral nerves—scalpel, chisel, hammer, and bone forceps were plied diligently, as usual for the edification of the students. Twice the poor creature escaped from its imprisonment, and at last, when brought back, and when struggles availed not to save it from the lacerating knife, it threw it paws around the cruel man's neck and licked his face! Which was the brute then? In the "Life of Sir Astley Cooper" there is a brief anecdote of a milder nature—(of course the more outrageous stories would not be published)—which is told, as it were, pleasantly. "During this time," it alleges, "Astley, who was always eager to add to our anatomical and physiological knowledge, made a variety of experiments on living animals. I recollect one day walking out with him, when a dog followed us, and accompanied us home, little forseeing the fate that awaited him. He was confined a few days till we had ascertained that no owner would come to claim him, and then brought up to be the subject of various operations. The first

of these was tying one of the femoral arteries. When poor Chance, for so we appropriately named him, was sufficiently recovered from this, one of the humeral arteries was subjected to a similar process. After the lapse of a few weeks, the ill-fated animal was killed, the vessels injected, and preparations made from each of the limbs."*

So much for the plea that an anæsthetic is used. True it is, some vivisectors exhibit chloroform in a few experiments on the smaller animals; but this agent cannot be always successfully administered to the larger quadrupeds, such as the horse and cow. And after all, if we are to credit one of the first surgeons of the day, its value must be rather limited, especially when delicate observations are required. Mr. Erichsen gives us the following testimony in regard to this point. "Chloroform, however, does not remove the physical impression produced on the system by a severe mutilation; hence the influence of a serious and prolonged operation is still manifested in the production of shock, of collapse, of slow recovery, even though the patient has suffered no actual pain. Certain operations appear to exercise a peculiar depressing effect on the nervous system, even though no pain be experienced."†

Those who make reckless assertions, that only rabbits, chickens, and ducklings are experimented on, also quite forget that they are exhibiting the unscientific character of their system, and are stating what is contrary, not only to truth, but to the principles which are laid down by their own authorities, to the effect that very many species of animals must be employed before deductions can be drawn. Any pursuit, scientific or otherwise, which will not bear public scrutiny, and which needs recourse to mis-statements to justify it, cannot be deemed a laudable one; and no pursuit better deserves supervision than one which is so eagerly and jealously guarded, lest the whole truth be known. Does it not appear as if it carried with it its own condemnation in the minds of its supporters? "Good wine needs no bush," and a fair transaction need not fear exposure. "If vivisection be so valuable to mankind—I have shown that it is not—then there would be less hesitation in proving its value, and far less need to hide its enormities from the eyes of the humane. Vivisection is not, however, content to mutilate those animals lowest in the order of creation; but the domestic pet, the cat, the wisely reasoning dog, which, as Burns nobly expresses it, owns man as its God, and whose attachment to him is so evidently influenced by moral feelings,

* *Life of Sir Astley Cooper.* Vol. I., page 142.
† *Science and Art of Surgery.* 3d ed.

suffer most largely, and have had to bear the most racking tortures. If the courageous and toiling horse, or patient ox have suffered less, it is because their money value protects them, until disease or old age carries them to institutions where they may be freely subjected to those investigations, which lead to a more dreadful death than nature ever intended.

It is this blunting of the finer feelings of the human heart—this destruction of that instinctive emotion of pity which is the strongest deterring influence in guarding us from cruelty—that most offends the moralist in the practice of vivisection. Cruelty differs from none of the other vices in its insidious approach to obtain possession of our more merciful sentiments, and to control the promptings of our God-like charity towards all animated nature. Domitian began a savage life by killing flies, and the most cruel disposition can amply gratify itself without let or hindrance, in vivisection, as it is at present allowed to be carried on. The gentle emotion which moves the youthful breast when an unfortunate animal is first heard to shriek from the pain of an experiment, becomes in too many instances, weakened in time, and the demoralising effects of unmitigated cruelty become familiar through frequent repetition. Far different is the action of that course of operative surgery which the student has to be a spectator of, or a participator in. In it he sees pain inflicted for the relief of actual suffering and to preserve life—the most sacred and justifiable of all the works which man may perform; in living dissections he can see nothing but fruitless torture in attempting to unravel some mystery or make a discovery—torture deliberately perpetrated on animals in health, creatures which have not an intellect or a religion to support them in their pitiful trials, and, unlike man, do not swoon, but to the last preserve their heightened sensibilities.

Can we wonder that the learned Dr. Johnson, who delighted in the progress of science as much as he did in the progress of mankind, should express himself in strong terms regarding such practices? "The idlers that sport only with inanimate nature," says he, "may claim some indulgence. If they are useless, they are still innocent; but there are others, whom I know not how to mention without more emotion than my sense of quiet willingly admits. Among the inferior professors of medical knowledge is a race of wretches, whose lives are only varied by varieties of cruelty; whose favourite amusement is to nail dogs to tables, and open them alive; to try how long life may be continued in various degrees of mutilation, or the excision or laceration of the vital parts; to examine whether burning irons are felt more acutely by the bone or

the tendon, and whether the more lasting agonies are produced by poison forced into the mouth, or injected into the veins. It is not without reluctance that I offend the sensibility of tender minds with images like these. If such cruelties were not practiced, it were to be desired that they should not be conceived; but since they are published every day with ostentation, let me be allowed to mention them once with abhorrence. Mead has invidiously remarked of Woodward, that he gathered shells and stones, and would pass for a philosopher. With pretentions much less reasonable, the anatomical novice tears out the living bowels of an animal, and styles himself physician; prepares himself, by familiar cruelty, for that profession, in which he is to exercise upon the tender and the helpless, upon feeble bodies and broken minds, and by which he has opportunities to extend his arts of torture, and continue those experiments upon infancy and age, which he has hitherto tried upon cats and dogs. What is alleged in defence of those hateful practices, every one knows. But the truth is, that by knives, fire, and poison, knowledge is not always sought, and is very seldom attained. The experiments that have been tried are tried again; and he that burnt an animal yesterday, will be willing to amuse himself by burning another to-morrow. I know not, that by living dissections any discovery has been made, by which a single malady is more easily cured. And if the knowledge of physiology has been somewhat increased, surely he buys knowledge dear, who learns the use of the lacteals at the expense of his humanity.

"It is time that universal resentment should arise against these horrid operations—which tend to harden the heart, extinguish those sensations which give man confidence in man, and make the physician more dreadful than the goat or stone."

No part of vivisection can be more strongly condemned, than that kind of desultory warfare against animal life and happiness which is waged by incompetent or unscrupulous individuals, from a vain notion that they are able to make discoveries, or are qualified to question those of more celebrated and accomplished men. Year after year finds them dabbling in science, as they imagine, ever pursuing some object which realizes no more than the agony, or death of their victims, and achieving no more than those barren philosophers who spend their lives—

> "Dropping buckets into empty wells,
> And growing old in drawing nothing out."

It is against such that the most earnest protests must be

entered, for it is doing violence alike to the fair name of science and the works of the Almighty to permit them thus to pass their time unchallenged. Put a stop to these idle and wicked workers, and vivisection would be deprived of nearly all its horrors. The extent of their cruelty, enormous as it is, can never be known, and, like their supposed contributions to human knowledge, humanity will be all the better for never knowing. Civilization and religion demand that the law take cognizance of their acts, that both be not mocked and disgraced by deeds which would overshadow the barbarities of a savage nation.

The constant repeating of experments is another feature in vivisection which must be suppressed. The chief object of science is truth, and when it is supposed to be attained, why should mercy and sensation be outraged by rehearsing over and over again the most dreadful tortures that can be perpetrated? What merit is there in demonstrating at such a fearful cost truths which require no such demonstration?

How often have I heard of—I will not say seen—division of the spinal cord performed by unfeeling, inquisitive men, and marvelled what pleasure or satisfaction there could be in seeing a poor animal in good health secured, a knife thrust into its back, and its body, after an amount of hacking and stabbing, reduced to the disgusting and painful condition which has been well described as "like a living head and dead trunk—dead to its own sensations, and to all voluntary over its movements."

And yet these artificial divisions of the spine could teach no more than the first one did, or than did those unavoidable accidents which so frequently happen to man, and some of the lower animals. Dogs and other creatures have been, and may be even now, sacrificed by dozens, to please idle and brutal curiosity, because it can be done with impunity, and because it is sanctioned by men of learning, who ought to know better. This evil is magnified a thousand times when the experiments are performed before people, who, in witnessing them, are either disgusted, or made hard-hearted and willing to become sharers in the common license to slay and torture by imitation.

The highest authority in the land, Professor Owen, is of opinion that no teacher of physiology is justified in repeating any vivisectional experiments merely to show their known results to his class or to others; that it is against abuses of this nature that humanity, Christianity, and civilization should alike protest.

Todd and Bowman speak in the same strain of such like

practices: "Nor can we hope that truth can be elicited from experiments and observations which are made before the public gaze, with more of the character of a theatrical exhibition than of a sober philosophical investigation.*

Looking, then, at the practice of vivisection in its scientific and moral bearings, the inevitable conclusion to which an impartial examiner will be brought is, that living dissections are not to be tolerated except upon the most urgent and imperative occasions; *and when every other means has been exhausted.*

Therefore is the subject brought to those limits—that it is

* As an instance of the license permitted to these acts of cruelty, and the far from revolting light in which they are viewed by those who commit them, let me refer to a Mr. Wainde, surgeon, of Kirby Moorside, who could not be contented with his torturing proclivities in private, but must needs advertise them in the public journal of a fashionable watering place. Writing to the "Scarboro' Mercury" in the early part of 1860, he says: "Having noticed the rapidity with which wounds grew up and heal in the lower classes of animals, I have often revolved in my mind the possibility of uniting, by keeping in strict approximation the raw surfaces of two animals not only of different species, but of totally different genera. With this view I have, at various times, endeavored to produce adhesive inflammation between two animals, by removing the whole of the true skin on a part of each, equal in extent, and then keeping the divided parts in approximation by means of bandages. In the last experiment of the kind that I made, I was eminently successful. Having had some time in my possession a rat, which had not quite attained its full growth, and which was to a great extent tamed, as it would permit any one to approach and caress it without any signs of fear, I determined upon making a final attempt, and I was confident of success. The next step was to procure another animal with which to unite it: and for this purpose I obtained a full-grown crow. Having removed the skin from the back of the rat, I with a scalpel removed a slice of the sub-cutaneous tissue, about two lines in thickness, so that the mouths of the minute blood-vessels might be opened. I then took off the feathers from the breast of the bird, and performed precisely the same operation, with regard to the size and thickness of the piece of flesh removed, which was one of an oval form, and about two and-a-half inches long, by one five-eighths broad, or thereabouts.

"After sponging the parts with a little cold water, I placed the crow with its legs across the back of the rat, and by means of a long, narrow bandage, kept them in such a position that they could not retract the incised surface in the least. I had them fed regularly every four hours, though for the first day the crow ate nothing. At the end of sixteen days I removed the bandages, and was delighted (!) to find that the whole surfaces were united, except at the extreme edges of the wound, the skin was beginning to unite. They now present a most peculiar appearance, and do not seem by any means disposed to part company. The crow scarcely possesses power of wing sufficient to lift its companion far from the ground, though it flutters along at the height of a foot or two, for several yards. Should any one be sceptical as to the fact, I shall have great pleasure in showing them the subjects of the experiment, if they will make it convenient to pay me a visit."

Is it not a matter for regret that the law did not admit of his first visitor being a police constable, armed with power sufficient to keep this visitor in "strict approximation" to a cell in the nearest prison? Who can wonder after this that these *amusing and delightful* experiments should be the admiration of a certain class! Can we blame young people, and those who have the powers of life and death over harmless creatures, if they perform cruel acts, when they have such examples among the members of a humane profession, whose experiments are as aimless and unmeaning as they are disgustingly wicked?

in the highest degree unjustifiable to sacrifice animals, especially by torturing and causing them pain, for the mere name of advancing science; and, in a minor degree, for the purpose of extending our knowledge of disease or sparing human suffering, until every other department of science which can minister to this research has been exhausted thoroughly, and in vain; and then only when there is something like certainty, not mere speculation, that the experiment will confer some significant boon upon the healing art.

Until the practice can be entirely suppressed by legal enactments, these considerations, if acted upon, would circumscribe to the narrowest degree the present limitless system of needless punishment. Too much should not be left to the consciences of vivisectors. Conscience, with such a man as Magendie, would be no check, and what one man of a humane disposition would deem unjustifiable and heartless cruelty, another would pride himself in asserting publicly as scientific and laudable research, though he could find no other apology for it. For this reason, the temporary right to experiment on living animals should also be limited to a very few, and they should be men who are not only qualified by general scientific attainments for such a responsible and profound task, but by their humane and merciful characters.

Such a function should not be intrusted to one or two individuals, but in the words of Dr. Wilson, "a select jury of competent witnesses," such as Dr. Reid invited at his original researches, should always, if possible, be present, as one of the most certain modes of making a single experiment suffice for many observers. As an amendment to this, I would propose that no experiment should be undertaken until this jury was present, and not until every inquiry had been made as to the history, the object, and the probable result of the dissection, and then its very detail should be carefully noted.

While proposing the above restrictions, and recommending them to the kind consideration of the mercifully disposed, as consistent with justice to those physiologists who imagine living dissections are indispensible to the welfare of mankind, let it not be supposed that in principle I think them either necessary or justifiable. It is my firm conviction that they are not necessary—that instead, they are confusing and prolific of error, and that other sources of information are open to the observer which are not only legitimate but commendable. If there was not danger to the moral feelings of those who witness such experiments, physiologists themselves would not exclaim against their being publicly practised, and if there is danger to the spectator, why not to the operator? It is an open confession of the influence of vivisection on the human heart.

To plead compassion for mankind, while he unfeelingly tortures animals as exquisitely endowed with sensation as himself, and with little or any result, is surely unworthy of, as it is inconsistent with, the holy responsibility vested in the professor of medicine. To him, as to all others, we may apply the saying of Plutarch, in his life of Cato the Censor: "It ought to be esteemed a happiness to mankind, that our humanity has a wider sphere to exert itself in, than bare justice. It is no more than the obligation of our very birth to practice equity to our own kind, but humanity may be extended through the whole order of creatures, even to the meanest; such actions of charity are the overflowings of a mild good-nature on all below us." A public writer has also thus expressed himself: "Cruelty is the only wrong which a man can do to another animal, but no one doubts that a very one-sided form of expediency—that form in which the convenience, the instruction, and even the amusement of the man outweighs the life of the animal—is the sole test of the moral qualities of the actions of men towards animals." Let us then give our humanity a wider sphere, and let us temper our one-sided expediency with a little more mercy; let justice be done in all our dealings with dumb creatures, who cannot tell us their wrongs, save by their screams and struggles. Do not have a law for punishing the poor man's cruelty to his bread-winner, and no law to punish the scientific amateur or professor, who can, without scruple of conscience or danger of interference, cause more suffering in a day than could be summed up in an enumeration of all the police-cases of cruelty to animals which are published for a month.

The poor coal-seller or porter could, perhaps, bring forward a far stronger plea of necessity and justification in working his debilitated, raw-skinned servant, while they were both hungry, and striving for their bread, than the gentleman who calmly and deliberately sets himself to torture to death his half dozen animals every now and again, simply to register a few facts under the name of science—facts curious enough, doubtless, but powerless to alleviate human misery.

Damaging alike to science, to the genius of humanity, and especially to the god-like functions of medicine, we submit the wrongs inflicted on the inferior creatures by vivisectors urgently demand redress, by the merciful interposition of legal restraint. That such is not far distant is certain, and it becomes every Christian and benevolent man—the lover of his own species, and of those beneath him in organization and intellect—to hasten the advent of such a happy release from torture and suffering.

Appendix.—*2d Proposition.*

The following notes having been kindly supplied in writing by Dr. Carpenter, one of the Judges, the Author, unwilling to suppress arguments and statements against his own views, thinks it due to the learned gentlemen to print them in this Appendix, with his own rejoinders.

(*a.*)

I entirely dissent from this statement. If we knock out of the existing system of universally-accepted physiological knowledge, all that has been learned from experiment, and what experiment alone can reveal, we should go back to a depth of ignorance, which must cause a most lamentable increase in human suffering, through the maltreatment of disease and injury which would be the result. I shall show that nearly the whole of our present knowledge of the functions of the nervous system has been obtained by experiment, and that the most minute anatomical research could never have disclosed it. The author has obviously a very erroneous conception of the relative shares of anatomy and experiment in Sir C. Bell's discoveries. This I shall show further on (*c.*) But he utterly ignores the great doctrine of reflex action, which rests entirely on an experimental basis. And he makes no allusion whatever into the recent researches of Brown-Séquard, and others as to the vaso-motor nerves, which I hold to be of the utmost therapeutic value. Again, the Hunterian treatment of aneurism by ligature, which has saved hundreds, perhaps thousands, of valuable human lives, was worked out by experiments on a comparatively small number of animals. Surely the humanity argument is here all in favour of judiciously-conducted experiments. What Sir A. Cooper did in regard to the operation of tying the abdominal aorta was to ascertain by experiment on a dog, whether he would be justified in trying the operation on the human subject, by the re-establishment of the circulation below the ligature through the collateral vessels. Will the writer affirm that he ought either to have operated on the human subject without this preliminary trial; or that he ought to have let the patient die for want of it? If I am not mistaken, the operation has been since successfully performed by Mr. Syme; at any rate, its partial success in Sir A. Cooper's hands showed that it affords a chance of saving life in a case otherwise desperate.

[I have simply to repeat, in reply to the first part of the above paragraph, that I have diligently searched in vain for the discoveries made through experimentation upon animals, without which there would now be "a lamentable increase in human suffering;" and I am assured by many medical practitioners that they are no more enlightened as to these discoveries than myself. It is a pity that, instead of this often-repeated assertion, we have not been furnished with satisfactory details which would convert the assumption into an established fact. With regard to Hunter's great discovery, which Dr. Carpenter attributes to vivisection, it will suffice to quote Professor Owen, who, in his opening address, at the

twenty-eighth meeting of the British Association for the advancement of science, held at Leeds in 1858, thus refers to Hunter:

> "Some medical contemporaries of John Hunter, when they saw him, as they thought, wasting as much time in studying the growth of a deer's horn as they would been bestowed upon the symptcms of their best patient, compassionated, it is said, the singularity of his pursuits. But by the insight *so gained* into the rapid enlargement of arteries, Hunter learned a property of those vessels which emboldened him to experiment *on a man* with aneurism, aud so to introduce a new operation which has rescued from a lingering and painful death thousands of his fellow-creatures."

Without asking Dr Carpenter for his proofs, I am content to leave the question at this point, in order that the doctor may settle the disagreement with Professor Owen, with whom he he is evidently at right angles in this matter.—G. F.]

(*b.*)

Every department of physiology has had to struggle through this phase of doubt and contradiction; but any one familiar with the history of experimental physiology must be aware that we have now a large body of well-ascertained facts on which all are agreed, and that the matters still in doubt are of compatively secondary importance.

[True, but, unfortunately, the history of vivisection shows that "well-ascertained facts" have no sooner been accepted, than a new vivisector has arisen, and, by more recent experiments, has demonstrated the unsoundness of the "well-ascertained facts."—G. F.]

(*c.*)

Anatomy, in Sir C. Bell's hands, led to the suspicion that the anterior and posterior roots of the nerves had diverse functions; but what these were it could not reveal. Only experiment could show the anterior to be motor, the posterior to be sensory. Anatomy alone misled Sir C. Bell in his interpretation of the functions of the fifth and seventh facial nerves, and it was experiment alone that put him right. Now, here was a point directly bearing on the treatment of facial paralysis, tic doloureux, &c., which has been previously based on most erroneous notions.

[This note is contradictory of Sir Charles Bell's own express statement, left on record probably that we should not attribute his discoveries to experimentation. He says he performed experiments only to demonstrate to others that which he had previously discovered and made conclusive by other means. To assert that Bell was not always right, is to say he was human; and, surely, when the history of vivisection is full of the grossest blunders and the most serious errors, it is poor logic to contend that Sir Charles's shortcomings appear as witnesses against his methods of discovery, and in favor of vivisection.—G. F.]

(*d.*)

I must entirely disclaim the general inference which the author bases on a limited proposition. I go as far as any one in the importance I attach to anatomical investigation, and in faith as to the value of the "experiments prepared for us by nature." But the author ought not to ignore the explicit testimony I have borne to experiments in my chapter on the determination of functions of nerves.

[If the learned doctor contradicts himself, I submit it is not my fault. I refer the reader to his book.—G. F.]

(*e.*)

If the author were better informed as to the history of our knowledge of asphyxia, he would not speak with contempt of these results. The most absurd (as we now account them) doctrines formerly prevailed; and our present knowledge of the pathology of asphyxia is entirely due to experimental research.

[Is this quite true? I have a little book by my side, a portion of which has recently excited much attention; it is the latest Annual Report of the Royal Humane Society, in which appears a report of a Committee appointed by the Royal Medical and Chirurgical Society to investigate the subject of suspended animation. The Committee consisted of several eminent vivisectors, and resolved to pursue the inquiry—1. By experiments upon living animals; and 2. By experiments upon the dead human body. Upwards of seventy experiments were made by these gentlemen upon living dogs, some of the animals having to undergo the torture of two or three distinct operations—in fact, were restored from the jaws of death to be re-tormented. Incisions were made in the trachea, into which tubes were inserted, fitted with corks to cut off the supply of air, in order to ascertain the duration of the death struggles. Others for similar purposes had their heads forcibly held under water, or plunged into mercury, or thrust down into liquid plaster of Paris—or submitted to other tortures. The most elaborate measures were adopted, and great patience and skill were shown to make these experiments successful, and—*cui bono?* We will quote from the Report of these learned vivisectors: "These results lead to the conclusion—First. That a dog may be deprived of air during a period of three minutes fifty seconds, and afterwards recover without the application of artificial means; and, secondly, that a dog is not likely to recover if left to itself after having been deprived of air during a period of four minutes ten seconds. Other experiments, which will subsequently be referred to, in connection with other questions, tend also to confirm the above fact, viz., that in dogs the doubtful interval of recovery and death lies between three minutes fifty seconds and four minutes ten seconds."—or, that if you deprive a dog

of air for a certain period he will die! A mighty discovery, and deserving the dignity of the royal medical Chirurgical Society. But the question is still unanswered—if a dog will live five minutes without air, a cat four, a guinea-pig three, how long will a man live? After these scientific and humane operations, the Committee state, "no definite conclusion concerning the relative value of the various methods of artificial respiration can be drawn from these experiments;" and they, therefore, "refer to the report of experiments upon the dead human body,"—and with good reason, for these alone were found of practical value. The whole transactions of the vivisectors were a magnificent failure, and if Dr. Carpenter can find comfort in them, it is more than any other humane man can do. No case can be quoted which will better illustrate the utter uselessness and cruelty of these operations; for, as the reader will see, the simple advantage gained from these disgusting abuses is, that the learned Committee is able to assure the Royal Humane Society, that their plan of restoring drowned persons, adopted many years before, (and for which we are not indebted to vivisection,) is the best method that can be used. Well may Dickens say:

"*Inhumane Humanity.*—Will the Society for the Prevention of Cruelty to Animals be good enough to look after the Royal Inhumane Society? I make the request in behalf of the dogs, the cats, the guinea-pigs, and the rabbits, who have a very serious charge to bring against the society. . . . In the report we find a record of nearly a hundred cruel experiments made upon the lower animals, for the purpose of investigating the subject of suspended animation. This is the plan generally and commonly adopted: 'The animal is secured on its back, and the trachea is exposed by a single incision in the mesial line of the neck' (which, being translated into plain English, means that the animal is tied up and has its throat cut.) 'A ligature being passed round it, it is opened by a vertical cut, and a glass tube, as large as can conveniently be inserted, is passed into it for a short distance downwards, and firmly secured by the ligature. Through this tube, while patent' (fine words will not cover throat-cutting,) 'the animal breathes freely, but the supply of air can be at once completelcy ut off by inserting a tightly-fitting cork into the upper end of the tube.'"

[Then follows the record of experiments, appended to which is the following note:—'The duration of the heart's action was conveniently ascertained by means of a long pin inserted through the thoracic walls into some part of the ventricles. So long as the heart continued to beat, the pin moved, and its motions were thus recorded for some time after the cardiac sounds had ceased to be audible.']

'Passing over sixteen other cases of neat throat-cutting and nicely-contrived suffocation, accompanied by the insertion of pendulums in the heart . . . We pass from experiments in choking to experiments in drowning. . . When I came to the double performance of cutting the throat first and drowning afterwards, I was fain to believe that the force of experimental surgery for the benefit of mankind could no further go. But I was mistaken. On turning over the page, I find horrors upon horror's head accumulating. 'Experiment 53. A middle-sized dog was deprived of air in the usual way, by plugging the trachea; 1 minute after its

last respiration, the actual cautery was applied by drawing the cautery-iron, heated to a white heat in a gas jet, over different parts of its chest and back. The dog died, or rather there were no symptoms of its recovery.' No one will go so far as to declare that the slow suffocation of cats and dogs, the cutting of their throats, the pierceing of the ventricles of their hearts with pins, are not acts of cruelty. But no doubt it will be said by some that such experiments are justifiable and necessary in the interests of surgical science for the benefit of mankind. Their necessity I dispute. A set of rules for restoring suspended animation in the human body was framed many years ago, and all the experiments recently made on animals have added little or nothing to our knowledge of the treatment of such cases.

"The new method being in all essential respects identical with the old one, it would appear that nearly a hundred animals have been tortured by the Royal *Humane* Society's chirurgical gentlemen to no purpose. Man may be justified—though I doubt it—in torturing the beasts, that he himself may escape pain; but he certainly has no right to gratify an idle and purposeless curiosity through the practice of cruelty."—*All the Year Round. No.* 360. G. F.]

(*f.*)

One of the results now best established by experiment is, that the secretion of gastric fluid is essentially independent of the eighth pair; but that it is temporarily suspended by its section, as by a shock to the nervous system. No observations upon such cases as that of Alexis St. Martin could have established this most important result.

[If so, *cui bono?*

(*g.*)

Already noticed under Note *a*.

(*h.*)

I was intimately acquainted with Dr. John Reid, and would hold him up as the model of an experimental physiologist. I am sure that he never inflicted suffering which he could regard as useless, and in his short life and comparatively limited range of inquiry, he settled more important questions than Magendie during his long and brutally extended career of operations. I think it very unfair to cite expressions used by him under the agony of pain, to express a penitence for what he had done, which I know that in his calmer moments he did not feel; for I have letters from him written very near his end, in which he looks forward to the continuance of his scientific inquiries as one of the sources of happiness in a future state. I am myself prepared to uphold and justify everything which he did; whilst I should, equally with the author, repudiate as unjustifiable every needless repetition of experiments attended with animal suffering.

[It is, indeed, to me a matter of much regret that Dr. Carpenter should think I have acted "very unfairly" in quoting the words of Dr. John Reid during his sufferings. Nothing could be further from my intention than to take any undue advantage of a loose thought or a random observation, elicited during the pangs of agony from a despairing sufferer; but the reader will, upon re-perusal of my observations, bear me witness that I have been particularly careful in this regard. Surely I cannot be accused of acting unfairly in quoting a statement, which his biographer has taken great pains to

explain in the following note to the paragraph referred to in the essay:

> "I cannot give the exact words (the term 'judgment' excepted), which have escaped my memory, as well as Professor Goodsir's, from whom I had the statement at the time when it was made, but the members of Dr. Reid's family, *who heard him more than once make a similar statement*, confirm their general accuracy.—*Life of Dr. John Reid*, p. 179.

There can be no more unfairness in quoting these words than those of any other writer, whose operations upon animals have, in many instances, drawn a confession of regret or disapprobation from themselves, when they had seen, after long years of worse than fruitless torturing, the little to be gained from vivisections.—G. F.]

(*i.*)

See Note *d*.

(*k.*)

I certainly never intended to lay down any such general proposition. If the sentence, as it stands, is to be found in either of my books, its meaning must assuredly be limited by the context.

(*finally.*)

I would ask the writer, in conclusion, to consider what justification is to be offered for the universal practice of castrating animals? There is here not only the pain of the operation, but the deprivation of the animal's power of sexual enjoyment through the whole of life. Yet we feel that this is justifiable, in the case of the horse, merely that he may be made more serviceable to man; and in the case of the ox and sheep, that their flesh may be more palatable.

Or, again, let me take the case of chloroform. Surely any amount of suffering that the case might have required might have been legitimately inflicted upon the lower animals, to secure such an inestimable boon to humanity.

I hold it to be required by the highest humanity to perfect the sciences of physiology and pathology, for all experience shows that the improvement of the healing art has gone hand in hand with the advance of those sciences; whilst discoveries, which at first appeared likely to have only a scientific value, come in time to find most important practical applications. I quite agree with the author that everything should first be sought out by anatomical inquiry and pathological observations, so far as these can possibly be carried. But when they have yielded all the information obtainable from them, a few well-devised experiments will often (as in the cases of Sir C. Bell and Dr. J. Reid) clear up the whole mystery. And when their results have been accepted by those best qualified to judge of their value, I entirely agree with the author that the repetition of the experiments is unjustifiable. I never, when a teacher of physiology, practised such repetitions, and I do not believe that pupils really learn anything from them.

On such subjects as the functions of the different parts of the Encephalon, I do not believe that experiment can give trustworthy results; since violence to one part cannot be put in practice without functional disturbance of the rest. Here I consider that a careful anatomical examination of the progressively complicated forms of the Encephalon, from fishes up to man—the experiments ready prepared for us by Nature—is far more likely than any number of experiments to elucidate the problem.

[With regard to the amount of cruelty attending emasculation, I would scarcely venture to name it in the same breath with that accompanying nine hundred and ninety-nine out of a thousand vivisections; and it is difficult to conceive why such a question should be asked at all, or why an attempt should be made to diminish the hideousness of nearly all experimental operations on the living body, by a reference to this surgical operation. According to the testimony of the most enthusiastic and able physiologists, living dissections are either prolific in disseminating error and doubt, or are entirely barren of useful results; whereas it is obvious to the meanest comprehension, that the simple and not very painful operation, for the removal of the reproductive organs, is not only certain in producing the required results, but has both necessity and convenience to commend it. Without recourse to emasculation, many animals most essential to man in the important affairs of life, would be not only utterly useless, but dangerous alike to other animals, to themselves, and to man. By this operation, the organism of the creatures submitted to it, undergoes certain remarkable modifications, either in form, disposition, or in the nutritive functions, entailing no pain or discomfort. Its influence on the character or disposition of an animal is most marked, and has attracted the attention of observers from the earliest times until the present. The horse deprived of its generative instincts, submits himself completely to the will and the action of his master, loses nothing of his strength or endurance, can be used at all times, and often under circumstances when the perfect animal could not be successfully used. Those who have been much among entire horses in this country, or in India, well know how savage they oftentimes are, and what an amount of injury they inflict, sometimes on their own, and on the human species. The male of the bovine species, it is well known, is very often not only unmanageable, but vicious to an extreme degree on arriving at adult age; when castrated, it is docile to a wonderful extent, and ready to meet all the exigencies of domestication. The patient "trailing-footed" ox, is the very antithesis of the mad, bellowing bull, whose unsteadiness and fury are only too often beyond control when he is excited. The ram, especially when laboring under sexual excitement, is sometimetimes a most formidable aggressor, and a source of danger to his own species and to mankind: when castrated he is transformed into the most inoffensive of animals; in fact, into the very mild sheep—and so with other animals. Its influence is, perhaps, not less with regard to form, and by it man may be said, in a certain

degree, to mould animals to the shape and size best suited to the wants of human society, as well as to promote the happiness of animals. The weapons of offence become lessened or disappear: the ox and the sheep acquire the horns of the females of their species; the tusks of the boar are not seen in the pig which has been castrated at an early age; the sharp spurs of the cock are invisible altogether, or so arrested in their development as to be useless; so that these animals are not a cause of injury to their own or to any other species.

In modifying the nutritive forces to the advantage of mankind, castration is a most important and highly laudable operation. When the sex is annulled, the animal lives no longer as a member of a species, but as an individual; all the assimilable materials are devoted to other purposes than those of maintaining the integrity of the species, and are diverted into channels which best suit the necessities of man; in those creatures not employed as moving powers, but chiefly reared as food-producers, fat and muscle are greatly increased in quantity and quality, and their flesh acquires a taste and a succulence very superior to that of an animal which has been left entire. Nothing can be more loathsome than the peculiar heavy and rank taste and smell which the tissues of an animal possess. Castration, then, is a means of accommodating the flesh of the living animal to the better nourishment of man; and if it be justifiable to slay animals for food, it is equally justifiable to improve their flesh in quantity and quality to the highest degree that can be attained, so long as the animals are not subjected thereby to pain.

We have no proof that, beyond the few seconds required for the operation, the castrated animal suffers any pain or inconvenience whatever, or that the loss of sexual enjoyment is a loss of anything but anxiety, feverishness, ferocity, and injury. We cannot say that the gelding ever *thinks* of his deprivation; but we are certain that he never manifests any despondency, or any external sign by which we could infer that he experiences any pain or regret at his loss. But we do know that the entire animal, when prevented from obeying his sexual instincts, for various reasons, suffers exceedingly; and at certain seasons in India, to my knowledge, there are numerous cases of loss of appetite for food, feverishness, debility, emaciation, spermatorrhea, and even death, from over-excitement of the sexual organs. Entire animals are more liable to disease when in a state of domestication than those which have been emasculated, and the risks they run from injury from each other are very great.

Much more could be said on this subject; but when I assert

that castration is an operation of the greatest possible value to mankind; that it causes no loss or hardship to animals submitted to domestication, but is rather an advantage; that the trifling pain attending the operation is far more than compensated for, in the immunity it gives the creature from injury by its own species, I offer enough to prove that it cannot be compared for utility and humanity with the operations performed by the vivisector, which are begun in doubt, carried on sometimes for "days, or weeks, or months," with incredible pain or torture to the hapless creature which has no redress and receives no benefit.

With regard to chloroform—let me ask if the discovery of its valuable properties was made by experimenting with it on animals? I think there is abundant proof to the contrary. It was not until 1864 that its anæsthetic properties were, it may be truly said, discovered by a chemist of Massachusetts, Dr. Charles T. Jackson. In a letter addressed to the Academy of Science, and communicated by M. Elie de Beaumont, he says:

> "For five or six years I have known the particular state in which the nervous system is plunged by the inhalation of the vapor of sulphuric æther, which I have inspired in large quantity, in first in form of experiment, and afterwards at a time when I had a very bad catarrh, caused by the inhalation of chlorine. Lately, I have made *a beneficial use of this fact, in inducing a dentist of this town* (Boston) *to administer the vapor of æther to persons who were having their teeth extracted.* It was observed that these people did not experience any pain during the operation, and no inconveniences resulted from the administration of the vapor of æther. I afterwards begged this dentist to go to the general hospital of Massachusetts to administer the vapor of æther to a patient who was about to submit to a very painful surgical operation. The result was that the patient did not experience any pain during the operation, and went on well subsequently. An operation on the jaw, an amputation of the thigh, and the dissection of a tumor, were the subjects of the first surgical experiments. Since then numerous operations have been performed on different patients with the same success, and always without pain; the persons so operated on have had a remarkable easy convalescence, and have not experienced any nervous shock."

In "*Silliman's American Journal of Science and Art*," for January, 1832, the discovery of chloroform is announced by Mr. S. Guthrie, of Sacket's Harbor, New York, in a paper entitled "A New Mode of Preparing a Spiritaous Solution of Caloric Æther;" it proceeds to state that he had used the product very freely during the previous six months to the point of intoxication; that he had found it singularly grateful, producing promptly a lively flow of animal spirits, and consequent loquacity, and leaving little of the depression consequent on the use of ardent spirits; that it promises much as a rem-

edy in cases requiring a safe, quick, energetic, and palatable stimulus, and that for drinking it requires an equal weight of water. It was discovered about the same time by M. Soubeiran. Nothing was known as to its physiological effects until 1847, when Professor Simpson, of Edinburgh, accidentally administered a small quantity, kept as a curiosity, to himself and friends, and this led to its discovery as a powerful and prompt anæsthetic agent. Experimentation upon the lower animals had nothing whatever to do with the glorious and blessed discovery of either of these agents, else their discoverers tell untruths.—(*See Dr. Cogswell's Paper on the History of Chloroform, read at a meeting of the Medical Society of London, Dec.* 6, 1847.)

It is a curious circumstance that, while vivisectors are eagerly (and incorrectly as I have shown) claiming the discovery of chloroform as a trophy of vivisection, other vivisectors, among whom are Dr. Benjamin Richardson, are arguing the need of further vivisections for the purpose of learning more relating to chloroform, or of discovering a more safe and useful anæsthetic.

EXTRACT

FROM

"MEDICAL EDUCATION IN AMERICA," BEING THE ANNUAL ADDRESS READ BEFORE THE "MASSACHUSETTS MEDICAL SOCIETY," JUNE 7, 1871,

BY

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How few facts of immediate considerable value to our race have of late years been extorted from the dreadful sufferings of dumb animals, the cold-blooded cruelties now more and more practised under the authority of Science!

The horrors of Vivisection have supplanted the solemnity, the thrilling fascination, of the old unetherized operation upon the human sufferer. Their recorded phenomena, stored away by the physiological inquisitor on dusty shelves, are mostly of as little present value to man as the knowledge of a new comet or of a Tungstate of Zirconium: perhaps to be confuted the next year; perhaps to remain as fixed truth of immediate value,—contemptible, compared with the price paid for it in agony and torture.

For every inch cut by one of these experimenters in the quivering tissues of the helpless dog or rabbit or Guinea-pig let him insert a lancet one-eighth of an inch

into his own skin, and for every inch more he cuts let him advance the lancet another eighth of an inch, and whenever he seizes, with ragged forceps, a nerve or spinal marrow, the seat of all that is concentrated and exquisite in agony, or literally tears out nerves by their roots, let him cut only one-eighth of an inch further, and he may have some faint suggestion of the atrocity he is perpetrating, when the Guinea-pig shrieks, the poor dog yells, the noble horse groans and strains—the heartless vivisector perhaps resenting the struggle which annoys him.

My heart sickens as I recall the spectacle at Alfort, in former times, of a wretched horse, one of many hundreds, broken with age, and disease resulting from life-long and honest devotion to man's service, bound upon the floor, his skin scored with a knife like a gridiron, his eyes and ears cut out, his teeth pulled, his arteries laid bare, his nerves exposed and pinched and severed, his hoofs pared to the quick, and every conceivable and fiendish torture inflicted upon him, while he groaned and gasped, his life carefully preserved under this continued and hellish torment, from early morning until afternoon, for the purpose, as was avowed, of familiarizing the pupil with the motions of the animal. This was surgical vivisection on a little larger scale, and transcends but little the scenes in a physiological laboratory. I have heard it said that "somebody must do this." I say, it is needless. Nobody should do it. Watch the students at a vivisection. It is the blood and suffering, not the science, that rivets their breath-

less attention. If hospital service makes young students less tender of suffering, vivisection deadens their humanity, and begets indifference to it.

In experiments upon the nervous system of the living animal, whose sensibility must be kept alive, not benumbed by the blessed influence of anæsthesia, a prodigal waste of suffering results from the difficulty of assigning to each experiment its precise and proximate effect. The rumpled feathers of a pigeon deprived of his cerebellum may indicate not so much a specific action of the cerebellum on the skin, as the more probable fact that the poor bird feels sick. The rotatory phenomena, once considered so curious a result of the removal of a cerebral lobe, were afterwards suspected to proceed from the struggles of the victim with his remaining undamaged and unpalsied side. Who can say whether the Guinea-pig, the pinching of whose carefully sensitized neck throws him into convulsions, attains this blessed momentary respite of insensibility by an unexplained special machinery of the nervous currents, or a sensibility too exquisitely acute for animal endurance? Better that I or my friend should die than protract existence through accumulated years of torture upon animals whose exquisite suffering we cannot fail to infer, even though they may have neither voice nor feature to express it.

If a skilfully constructed hypothesis could be elaborated up to the point of experimental test by the most accomplished and successful philosopher, and if then a single experiment, though cruel, would forever settle

it, we might reluctantly admit that it was justified. But the instincts of our common humanity indignantly remonstrate against the testing of clumsy or unimportant hypotheses by prodigal experimentation, or making the torture of animals an exhibition to enlarge a medical school, or for the entertainment of students, not one in fifty of whom can turn it to any profitable account. The limit of such physiological experiment, in its utmost latitude, should be to establish truth in the hands of a skilful experimenter, with the greatest economy of suffering, and not to demonstrate it to ignorant classes and encourage them to repeat it.

The re-action which follows every excess will in time bear indignantly upon this. Until then, it is dreadful to think how many poor animals will be subjected to excruciating agony, as one medical college after another becomes penetrated with the idea that vivisection is a part of modern teaching, and that, to hold way with other institutions, they, too, must have their vivisector, their mutilated dogs, their Guinea-pigs, their rabbits, their chamber of torture and of horrors to advertise as a laboratory.

From

REPORT OF THE

SOCIETY FOR THE PROTECTION OF ANIMALS IN FRANCE.

SEPTEMBER, 1871.

List of Publications received.

"L'ACTE de la Deglutition son Mecanism, par le docteur Moura. Paris, 1867. Delahaye. Ce livre était accompagné d'une lettre d'envoi, d'où nous extrayons ce passage significatif.

"La découverte que j'ai faite sur le déglutition n'a couté la vie à aucun animal. Cependant, depuis les temps les plus reculés jusqu'à nos jours, c'est àdire jusqu'en 1861 les physiologistes de tous les pays ont sacrifié les animaux le chien surtout, ce fidèle ami de l'homme, pour arriver à la connaissance de la déglutition chez l'homme.

"Magendie, en particulier, a laissé parmi nous, ses contemporains, une trop célèbre réputation à cet égard.

"Les expériences *in anima vili* sont souvent inutiles; elles conduisent rarement au résultat que l'ou attend.

"Je démontre à l'aide d'un instrument particulier, que la deglutition chez l'homme s'opère autrement que chez le chien.

"Ce serait done une cruauté sans excuse que de renouveler *a ce sujet* les hecatombes animales de mes prédécesseurs."—[Bulletin de la Société Protectrice des Animaux. Paris. Septembre, 1871.

[TRANSLATION.]

"The Act of Deglutition. Its Mechanism. By Doctor Moura. Paris. 1867. Delahaye." This book was accompanied by an introductory letter, from which we extract this significant passage:

"The discovery that I have made in deglutition has not cost the life of a single animal. Yet from the most remote times

down to our own day, that is to say until 1861, physiologists of all countries have sacrificed animals, especially the dog,—that faithful friend of man,—to arrive at a knowledge of deglutition in man.

"Magendie, in particular, has left among us, his contemporaries, a reputation only too celebrated in this respect.

"The experiments *in anima vili* are often useless; rarely leading to the results expected from them.

"I demonstrate, by the help of a special instrument, that deglutition in man is not performed in the same manner as in the dog.

"It would be, therefore, inexcusable cruelty to repeat, *for this purpose*, the animal hecatombs of my predecessors."